ELECTRICAL REVIEW

Vol. CXLVIII No. 3837 8TH JUNE, 1951

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Load Control

MORE GENERATING PLANT THE MAJOR REQUIREMENT

FROM the start of public electricity supply in this country, an occupier of premises within a defined distance from the mains enjoyed the legal right to demand uninterrupted service for all his electrical requirements from the responsible undertaking, which was liable to penalties in default. This right has, of necessity, been suspended by Defence Regulations, but it still exists. Its restoration will be costly and it is not unnatural that the prospect of spending about £100 million per annum on generating plant should give rise to a hope of finding less expensive methods of dealing with the peak-load problem.

Rising Consumption

The situation to be faced is that the output of power stations, which has approximately doubled in the past ten years, will probably be doubled again within the next ten years—more if the average of 2 kWh used by each factory worker is raised to anywhere near the United States figure of 6 kWh. The effect of the rearmament programme, also, remains to be seen. Arrangements for meeting the expected increase in consumption, which are in addition to those necessary for making up the present deficiency of generating, transmission and distribution plant, must be put in hand now.

When at the recent E.D.A. luncheon (*Electrical Review*, 20th April) Lord Citrine mentioned the large-scale tests being carried out on load controlling devices, but at the same time reiterated his claim for the highest priority allocation to the provision of generating plant, he, in our view, laid proper emphasis on the urgent major need but showed appreciation of the possibility of improving load factor which might later be helpful in emergency as well as desirable economically.

Cost of Power Cuts

Expenditure on power station and other plant over-states the net cost, however. On the same occasion, Mr. E. R. Wilkinson pointed out that the loss of production owing to last winter's load cuts, estimated by the Minister of Fuel and Power at between £8 and £10 million, would have paid the annual fixed charges on 1,500 MW of new generating plant with corresponding transmission and distribution capacity and would have saved through its greater efficiency 1¼ million tons of coal each year worth £3½ million.

The crux of the matter is immediacy. No control methods of which we have

knowledge would do more than alleviate load shedding. The application, on the requisite scale, of those found by tests to be feasible would take time. New generating plant would give useful and unrestricted service for perhaps thirty years, whereas those control devices which placed inconvenient restraints on the use of electricity ought to fall into disuse as soon as the necessity for load shedding and load spreading ceased. The more promising ways of exalting the valleys of the load curve were discussed in the Clow Report of 1948. These were essentially long-term measures; the only short-term recommendation of the Committee was, significantly, the unhappy surcharge on domestic consumption in the winter. The case for concentrating our resources on orthodox methods, which was made by Sir John Hacking in the Atkinson Memorial Lecture (reported in our issue of 27th April) appears to us to be watertight.

STATION EFFICIENCY

There has for some time been a desire among generating station engineers to secure the acceptance of a new standard expression for the thermal efficiency of power plant. Before nationalization it would have been difficult, if not impossible, to succeed in getting a suggestion of this kind generally adopted. Now that the whole industry is under one organization, it seems worth while renewing the effort to end the obscuration of merit which is unavoidable with the single-expression assessment now in use. For this reason we commend the three-part expression explained on another page. The proposal will, we believe, meet with the general approval of station engineers because it will enable a modern plant and its operating staff to be judged on their true merits. It should also increase knowledge of power station performance.

HOSPITAL RISKS

It is not easy to minimize the electrical risks that occur in hospital rooms in which inflammable anæsthetics are used. The subject is a very complex one which precautionary measures have not infrequently tended still further to complicate. Proper safeguarding demands adequate knowledge of the factors which may contribute to the dangers, so the Ministry of Health has re-issued Memo. 191 Med. (of 1935, now revised) which details the precautions to be observed together with a warning notice (of 1944) for display in surgical operating theatres. Though completely satisfactory answers have yet to be found for some of the questions involved, it would be foolish to ignore existing knowledge. The memorandum referred to accordingly offers advice about the choice of anæsthetics and the circumstances in which the use of some of them would be undesirable, together with brief accounts of typical accidents. It is to be hoped that hospitals will assist the Ministry further to reduce these risks by availing themselves fully of the advisory service of the two professional electrical engineers, qualified by active experience of the subject, who have been appointed for that purpose.

UNDERGROUND GRID

The usual reply to suggestions that the grid would be better underground than overhead is that it would have cost about eight times as much. The technical case is at least equally strong. In a contribution to "Electrical Engineering Theory and Practice," reviewed in this issue, Mr. E. B. Powell points out that at 132 kV the charging MVA per 100 miles would be about 180 for a cable compared with 8 MVA for an overhead line. For the whole 132 kV grid, he has calculated that the charging MVA would almost equal the maximum load of the entire country. This would have created problems of voltage regulation and stability very much more serious than those which often cause difficulties even with overhead construction.

PRICES AND PURCHASE TAX

The question of the inclusion of purchase tax in advertised prices of equipment has again been raised. This matter was dealt with in the *Electrical Review* of 25th November, 1949. There a case was made for the statement of the price and purchase tax separately where advertisements were likely to come to the notice of overseas buyers, who escape the tax. For shop windows and in advertisements confined to this country it is probably enough to give an inclusive price. It will be agreed that to state the price of an article with a vague "purchase tax extra" is not good practice.

Gypsum Winning

Greatly Increased Production From Modernized Handling

UP to about 1945 the output of the 80-year-old gypsum mine near Robertsbridge, Sussex, of Gypsum Mines, Ltd., was in the neighbourhood of 2,000 tons a week, but now, largely as the result of mechanization along modern materials handling lines, the output is about 9,000 tons a week.

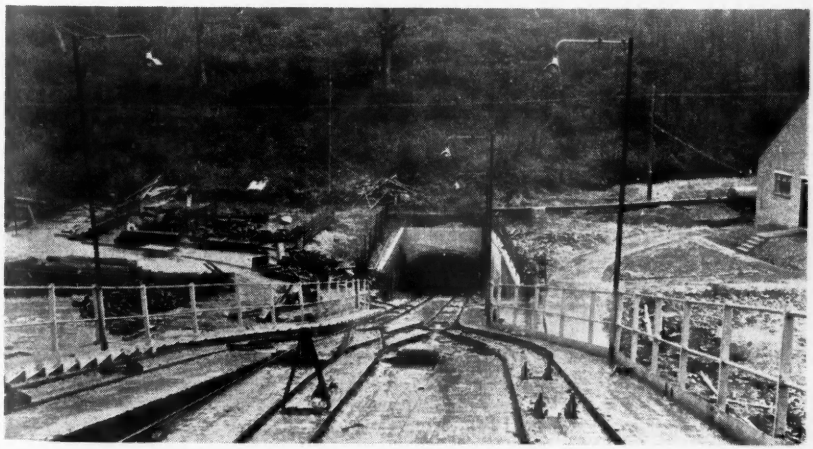
The workings are centred in the valley near Mountfield where the deposit lies underground in four seams. The top seam is about 120ft below ground level at the lowest point where a vertical shaft exists. This is one of three such shafts all about 10ft in diameter. The three vertical shafts serve an area which was worked up to 1945 and is known as the old mine.

Coincident with the modernization over the last few years a new area has been opened up and is served by an inclined drift or adit which constitutes the nucleus of the modern handling scheme we are about to describe. This later area is known as the new mine, but actually the two areas do not exist as separate mines and both are still being worked. With the exception of the adit which serves the new area only, the modern handling methods apply to both areas.

The four seams are disposed as follows and in the same order from top to bottom: No. 1 seam is 6ft thick and followed by 10ft of shale; No. 2 seam is 5ft thick and followed by 3ft of shale; No. 3 seam is 7ft thick and followed by 4ft of shale; No. 4 seam is 14ft thick. No. 2 seam is not being worked. No. 1 seam is dealt with exclusively in the old area by the vertical shaft system, while all three seams, Nos. 1, 3 and 4, are dealt with in the new area by the adit which is 400yd long and has a gradient of 1 in 5·4. About two-thirds of the total output of the workings is taken above ground through the new adit.

Following prospecting by means of lorry mounted boring equipment employing rotary drilling with "Tricone" cutting tools, the faces are opened up and developed on the pillar and stall working principle. Briefly this constitutes driving into each vertical face, at 14yd centres, workings which are themselves 7yd wide; thus between

A new adit constitutes the nucleus of the modern handling scheme



each stall is left a 7yd wide supporting pillar. Behind the 7yd limit the stall is worked at right angles to the first driving direction, i.e., parallel to the face, thus completing a row of 7yd square pillars and opening up a new face line for further forward driving.

The approach to the face road is by means of a gate road at one of the face ends, and at right angles to the face. This gate road is worked in advance of the face, to a point representing six months' normal face development, as a single pillar and stall line, thus constituting a guard against the possibility of driving the face forward up to faults in the rock. Also at right angles to the gate road, and thus in parallel with the face, is a trunk road which affords the primary access to the workings. There are now six machine faces in operation; four in the top seam (No. 1), one in No. 3 seam and the sixth in (No. 4) the bottom seam.

Cycle of Operations

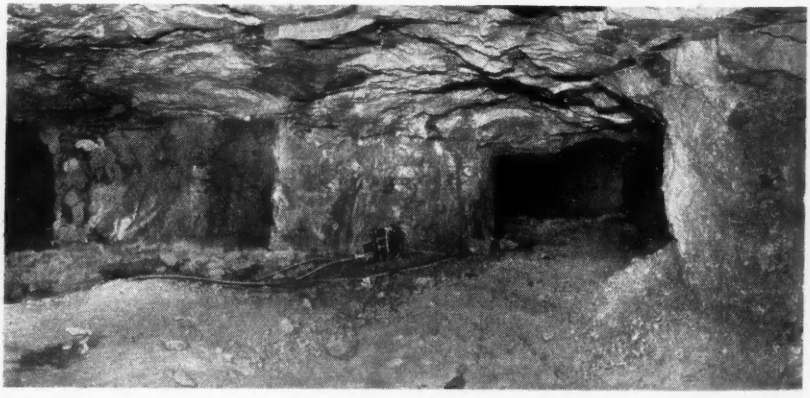
The primary operations in excavating the stalls are boring and blasting the rock from the face, breaking in the stalls the dislodged material to suitable sizes for handling, and removing the broken material from the stalls by scraper conveying. These three sets of operations are worked as a cycle in respect of each three adjacent stalls, so that whilst boring and blasting is taking place in one of the three stalls breaking is effected in the second stall and the material is being scraper conveyed from the third stall.

In readiness for each forward drive of the face there are erected along the face a 2in air pipe line for servicing the boring and breaking equipments, a 39in scraper hauler track movement of the three scraper haulers along the face, and a 30in Huwood face conveyor belt. Thus, to conform to the cycle principle, if, say, the three scraper haulers are opposite Nos. 2, 5 and 8 stalls, boring will probably be taking place in Nos. 1, 4 and 7 stalls and breaking will be carried out in Nos. 3, 6 and 9 stalls.

Rock Boring

In preparation for blasting, two methods of boring the rock at the face are employed: the centre cut and side cut method and, in the bottom seam only where there is fairly good breaking ground, the cut and flank method. Holman and Climax pneumatic jackhammers are employed for this work, and in the much thicker (vertically) bottom seam jacks legs are used in conjunction with the boring equipment. The blasting holes are usually bored to a depth (horizontally) of about 7ft. The blasting material is a T.N.T. and ammonium nitrate compound, and stemming is effected by gypsum dust in paper wrappers. The explosive is electrically fired by Davis " Dragon " or " Dreadnought " exploders, and on the average about 23 cwt of rock is released per lb of explosive used. Breaking is a further face or stall operation by which the released material is reduced to sizes suitable for handling. Huwood pneumatic

The faces are opened up and developed on the pillar and stall working principle



picks are employed for this operation, and in the case of larger pieces of rock block holes and secondary blasting are employed.

Total Load 2,000 kW

Boring and breaking are responsible for about 40 per cent of the power consumption underground which constitutes about two-thirds of the total load of 2,000 kW for the workings as a whole. Thus there is above ground an electrical load of about 1,000 h.p. for air-compressor driving and servicing these underground pneumatic operations. The face equipments operate with air at about 90 lb/sq in, but at the source the air is compressed to and supplied at 100 lb/sq in. The largest compressor is a two-stage (80 lb/sq in and 100 lb/sq in) Belliss & Morcom equipment which is directly driven by a 430 h.p., 300 r.p.m., 400 V Crompton Parkinson auto-synchronous motor served by a directly coupled 30 V field exciter. The motor is controlled by the usual stator switch and rotor speed regulating resistance. The compressor plant also includes a 190 h.p. (Lancashire Dynamo), a 120 h.p. (Crompton Parkinson) and a 110 h.p. (Mather & Platt) motor driven Holman compressors. Normally the two largest compressors are in operation, while the others serve as stand-by.

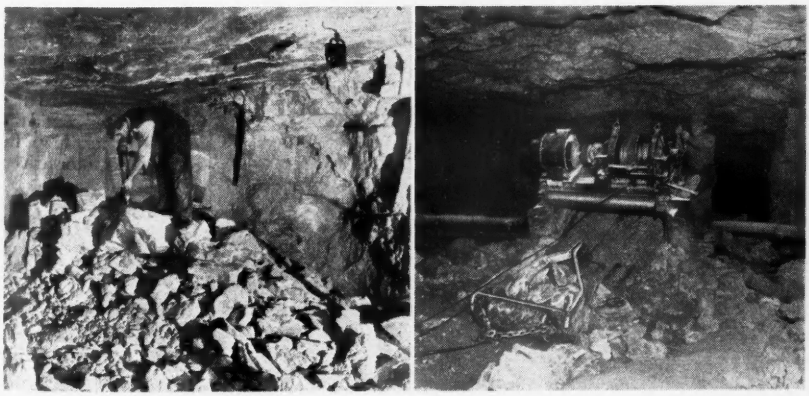
The broken rock is removed from the stalls by scraper conveyors which are worked in the face operation cycle already explained. Each scraper conveyor is operated by a scraper hauler which is a double-drum reversible winding equipment with each end of a continuous rope anchored to one of the winding drums. At the face end of the stall the rope travels round a pulley anchored to the floor, and the scraper proper is attached to a rope on one side of the pulley, so that it travels to and fro, i.e., into and out of the stalls by the reversal of the winding drums. In principle the operation is similar to that of a main and tail haulage.

All the scraper haulers are Holman ramp-mounted equipments, but while those employed at the face each have a separate chassis for carrying the hauler along the face of the hauler track, those at the forward ends of the gate roads are each mounted permanently on the ramp. Each scraper hauler is driven by a 15 h.p. C.P. motor and has a capacity of 20 tons per hour. The scraper proper delivers the broken rock directly on to the face conveyor which is aligned normally to the direction of scraping.

Conveyor System

In the new mine area the rock is brought from the faces to the main road haulage for transportation out of the mine by a system of face, gate and trunk conveyors erected along the face, gate and trunk roads, respectively, each forward conveyor delivering to the one at right angles to it and in front of it in respect of the direction of the material flow, by simple gravity transfer. All these conveyors are Huwood

The primary stall operations of boring and blasting, breaking (*left*) and scraper conveying (*right*) are worked as a cycle



There are simple gravity transfers from the face to the gate conveyors and from the gate to the trunk conveyors (shown above)

equipments with 30in fully troughed belts. The face conveyors are each 140yd long (single run) to "cover" nine pillars and nine stalls-plus, and each is driven by a 15 h.p., 960 r.p.m. C.P. motor. Transmission to the conveyor end drum is effected via a single reduction detachable gear box with a speed reducing ratio such as to afford a belt speed of 180ft/min. The driving system incorporates a loop take-up section for the conveyor belt adjustment. The average duty undertaken by a face conveyor is about 60 tons/hr. The gate and trunk conveyors vary in lengths according to the lengths of the roads, i.e., to the state of advancement of the face in the working, but we may cite the trunk system in No. 4 seam as a typical example. It is 450ft long and is driven by a 30 h.p., 960 r.p.m. C.P. motor. The transmission is similar to that of the face conveyor, but the conveyor belt speed is 220ft/min.

At the forward end of the gate conveyor, i.e., in advance of the face, is a fixed ramp carrying the scraper conveyor already referred to. The gate conveyors serve also as picking belts, and the rejects are stowed away in the old workings. The trunk conveyor passes the gypsum on to a hopper from which the tubs of the main road haulage system are supplied.

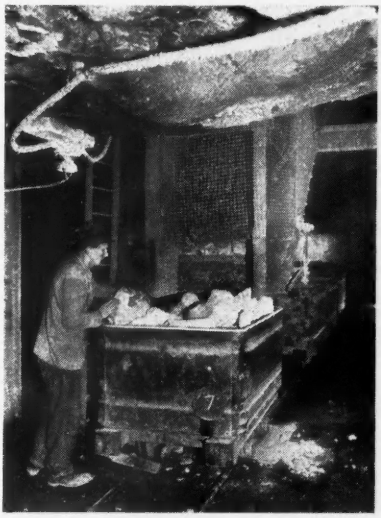
At the top of the adit, i.e., the mine entrance, the incline is continued above ground by an inclined gantry leading up to a tippler house about 30ft above ground level. Under the control of a winder to be referred to later, two trains of tubs—each tub of 30 cwt capacity and weighing 40 cwt overall—generally operate on the double track on the incline in a working cycle—one train up and one down simultaneously—at the ends of the ⅞in steel haulage rope. At the bottom of the adit, i.e., at about No. 4 seam level, the double track ends as a single track continuous loop. The empty downward tubs are diverted round the single track loop by way of a motor driven

The trunk conveyor *(right)* **passes the gypsum on to a hopper which serves the main road haulage system; part of district substation is also shown**

creeper conveyor on an upward incline, passing back to the double track by gravity and under a motor driven Ross continuous-chain rock feeder which is served from the hopper fed by the trunk conveyor. After refilling, the tubs decoupled from the down rope are recoupled to the up rope. At a point a little higher up the adit is a branch from the incline and the double track, and here again the double track ends as a single track continuous loop. Similar arrangements prevail on this loop for conveying the empty tubs and refilling them, except that in this case the hopper serving the Ross tub feeder is supplied by two trunk conveyors from seams No. 1 and No. 3.

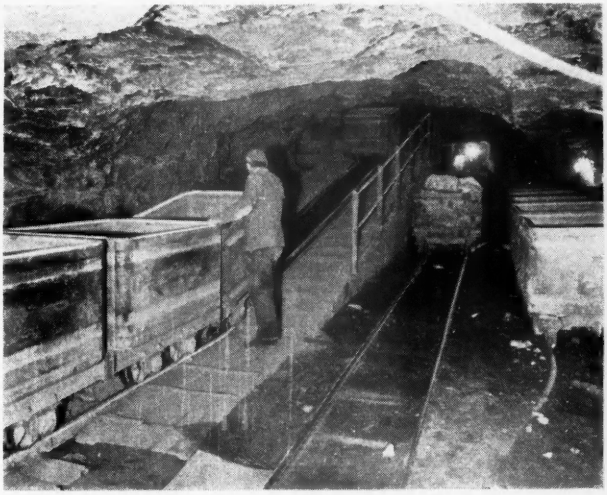
In the tippler house the filled tubs are decoupled and passed individually along a circular track which takes them, in turn, over a creeper conveyor on a weighbridge, through either of a pair of motor driven rotary tipplers, with direct starting and limit-switch stopping, for discharging the rock, and via another creeper conveyor, now as empty tubs, on to an idle track between the lines of the double track where they await recoupling on the main road haulage system.

The double-drum winder of the main road haulage system is driven by a 120 h.p., 735 r.p.m., 3·3 kV Metrovick slip-ring motor with transmission through a Beckett and Anderson enclosed gear of such reduction ratio as to afford a rope speed of 7·5 miles/hr. The motor is controlled by a stator switch and a rotor resistance regulator. Associated with the winding installations are both visual and audible A.T.M. signalling systems, while an emergency signalling system provides for stopping the winder from any point along the adit.



From the hopper the tubs are served by a continuous chain feeder

In the old mine area, i.e., part of No. 1 seam, the rock is transported from the face to the 120ft lift shaft on an underground main rope haulage system which is responsible for handling about one-third of the mine output. The haulage road is about 1·25 miles long and the tubs, each weighing



The double track of the main road haulage ends as a single continuous loop; empty tubs to loop via creeper conveyor on left and filled tubs from loop on right

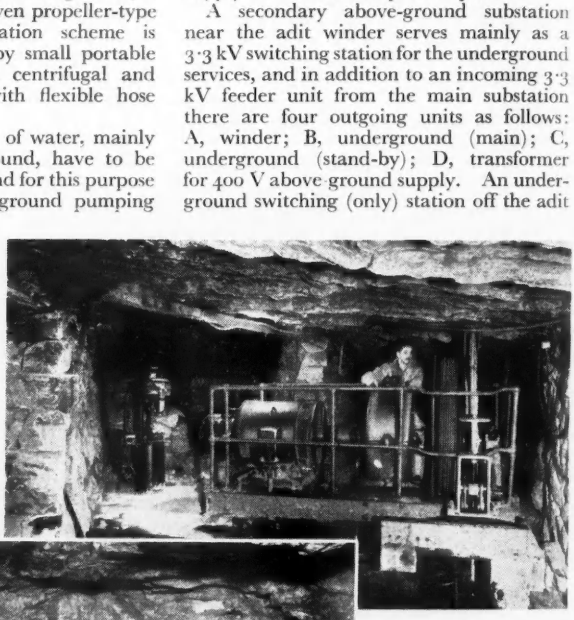
about one ton overall, are pulled individually along the 18in track by a 50 h.p. English Electric motor driven Beeander winder via a $\frac{5}{8}$in rope. The tubs are also passed up the shaft one at a time under the control of a 38 h.p. motor driven winder. Each underground district throughout the mine has its own supply road which is complete with a separate small motor driven haulage system for the supply of materials, other than the product, to the face.

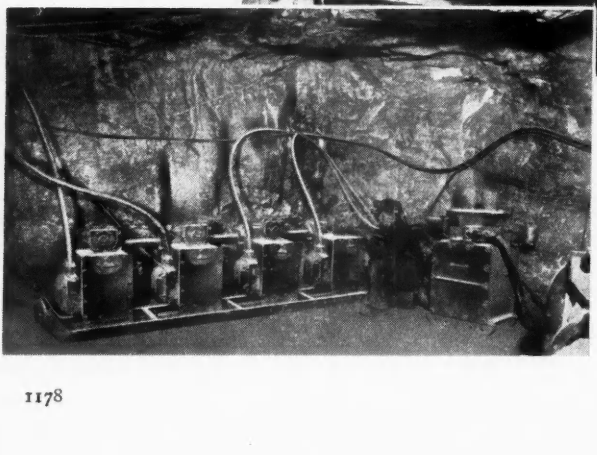
One of the former upcast shafts is now used for the main ventilation of the entire mine, and for this purpose there is installed at the bottom of the shaft, in a separate chamber with suitable air-locking doors, a 50 h.p. G.E.C. motor driven propeller-type fan. This major ventilation scheme is augmented at the faces by small portable booster Keith Blackman centrifugal and Meco axial flow fans with flexible hose outlets.

Considerable quantities of water, mainly drainage from above ground, have to be removed from the mine, and for this purpose there are several underground pumping stations, each with its collecting sump. A typical example of these pumping stations is the main adit station which has a 24 h.p. motor-driven double-stage M. & P. centrifugal pump which delivers 200 g.p.m. under a 220ft head. Here and there in the mine are small auxiliary compressed-air driven trench pumps which pass local water on to the main sumps.

In the foregoing we have deliberately confined our attention to the direct and indirect underground electrical applications, the consumption in respect of which represents about 60 per cent of the total electricity supply to the overall workings. A public supply from the South Eastern Electricity Board is received at 11 kV in a main above-ground substation in which two 500 kVA J. & P. transformers in parallel reduce the voltage to 3·3 kV, mainly for underground consumption, and a 550 kVA transformer provides a 400 V supply to the air compressor plant.

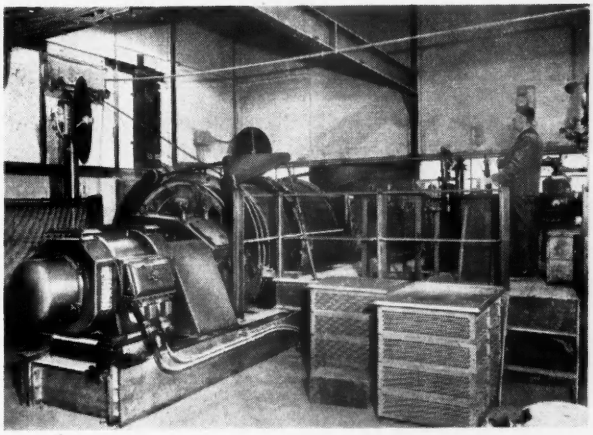
A secondary above-ground substation near the adit winder serves mainly as a 3·3 kV switching station for the underground services, and in addition to an incoming 3·3 kV feeder unit from the main substation there are four outgoing units as follows: A, winder; B, underground (main); C, underground (stand-by); D, transformer for 400 V above-ground supply. An underground switching (only) station off the adit





Above : **The double-drum winder of the main road haulage system gives a rope speed of 7·5 miles/hr.** *Left:* **Gate end switches in the district substation serve the room boxes near the face by permanent armoured cables**

There is a 1·25-mile main rope haulage system in the old mine area



near No. 1 seam is supplied directly from the above-ground secondary substation, and here four Reyrolle flameproof switch units control the major underground distribution. A district substation near the adit bottom at No. 4 seam generally typifies the underground distribution. There are an incoming 3·3 kV unit from No. 1 seam substation, and a pedestal unit controlling a 200 kVA 3·3 kV/400 V transformer which serves Ellison gate end switches from which room boxes near the face are supplied by permanent armoured cables. From these room boxes the scraper haulers, conveyors, etc., are supplied by trailing cables.

We are indebted to Mr. L. Biggs, general manager, the Gypsum Mines, Ltd., for permission to visit the mine and to publish this article, and to Mr. W. Gibson, mine manager, and Mr. G. Stalker, mine undermanager, for their help in obtaining information and taking the photographs.

Automatic Sheet Folding

AN interesting application of the photoelectric cell which we came across recently is in connection with the folding of sheets in the Wilmington, Kent, laundry of James Bentley, Ltd. The equipment was designed by Mr. K. Bentley, a director of the company, and is used to fold automatically laundered sheets twice in the same direction, an operation which was previously done by two girls.

Each sheet is fed forward from an ironer on to a number of parallel moving webbing belts. When it has moved forward a few inches the leading edge of the sheet interrupts a beam of light falling on to an " Osram " photoelectric cell and thereby operates a row of pneumatic grippers arranged across the path of the sheet. These hold the leading edge of the sheet and raise it slightly above the belts and as the remainder of the sheet is still moving forward a fold is created.

When the trailing edge of the sheet uncovers the light beam, a relay mechanism releases the gripper fingers and the two edges of the sheet fall together, a perfect fold being made.

The sheet then moves forward to a second photoelectric cell and gripper fingers and another fold is made in the same way. At this point the sheet is folded " long and narrow " and as the operator removes it from the folder she gives it the last transverse fold by hand.

Although this machine is used for folding linen sheets, the same principle could easily be applied to the folding of textiles, paper, leather-cloth, etc.

Another application of the photoelectric cell in this laundry is an important one at the present time as it results in quite substantial fuel saving. After washing, the clothes are passed through a drying room heated by a steam radiator and a fan to drive the hot air round.

A light beam is arranged to project across the room on to an " Osram " photoelectric cell and so long as the beam is obscured by clothes passing around the room on a conveyor, the fan continues to run. If, however, there is an interval between batches of work and the beam is unbroken, the photoelectric cell shuts down the fan, which in turn leads to a substantial drop in the steam consumption of the radiator. When more clothes come along on the conveyor the fan automatically restarts.

VIEWS on the NEWS

By REFLECTOR

A RECENT case has proved that Gas Boards (and no doubt Electricity) have power to break and enter premises when the occupiers fail to admit meter readers. But even if a consumer is most obstinate in his refusal or persists in ignoring written communications I consider that the loss of goodwill occasioned by forcible entry makes it not worth while. Some Electricity Boards, I believe (I have no first-hand knowledge of the matter as we always admit the meter reader) get over the difficulty by sending in a bill based on the reading of the last quarter. The idea is that if payment is withheld the consumer can be sued for the amount in the ordinary way which I imagine will seldom be necessary.

* * *

Getting around among the members of the Electrical Contractors' Association at Harrogate last week I heard on every side appreciation of the way in which the president had conducted the conference. Mr. Wallis certainly has a way with him. His wit and good humour were so enjoyable that one took for granted the smooth and efficient way in which the business proceeded. That, of course, is the art of chairmanship.

* * *

There was rather less criticism than might have been expected of the Electricity Boards and their methods. Only one speaker in the discussion on Mr. Penwill's paper ("Some Aspects of the Trading Structure of the Electrical Industry") touched directly on the subject; he averred that the B.E.A. (he really meant the Electricity Boards) was charging electrical contracting costs against electricity. Mr. Penwill in his reply said he declined to be drawn into a discussion of this matter. On the same day at another conference, that of the National Chamber of Trade, resolutions were carried calling for a limitation of the hire-purchase activities of the B.E.A. (again it should have been Electricity Boards) and for the prevention of unfair competition against retailers and contractors in the sale of apparatus and installation work. There was supposed to be an investigation of the Boards' trading methods but up to the present I have not heard of any results.

* * *

In conversations at the conference there were many expressions of regret at the inability of Mr. W. R. Rawlings, the first E.C.A. president, and Mr. W. H. Walton, past-president and for many years chairman of the Executive Committee, to attend this year. They were both at the annual dinner in January last but conferences are strenuous affairs and Harrogate is a long way from London. Their contributions to the growth and strength of the Association are, however, gratefully remembered by the members.

* * *

In the light of developments in the Persian oil situation, I have re-read with heightened interest the articles on "Electricity in the Oil Industry," which appeared in the *Electrical Review* between 17th November and 5th January last. These showed the great importance to electrical manufacturers of oil production, refining and testing, since, in conditions under which reliability and safety are paramount considerations, British equipment is to be found all over the world whether or no the installations are British controlled. In typical modern refineries it may account for as much as 10 per cent of the capital expenditure and almost as high a proportion on the oil fields themselves, which provide also scope for diesel engines and gas turbines. Moreover the many derivatives of oil also require large amounts of electricity.

Power Station Performance

The Three-part Expression of Thermal Efficiency

By W. S. BURGE, M.I.E.E.*

POWER stations in this country can be divided between two classifications. The first and most numerous includes the older stations that have passed through many years of technical development and in which the different generating units have widely differing characteristics. In these stations the generating sets are nearly always interconnected in such a manner that it is not possible to separate the operating efficiency of one unit from that of its neighbours. It is often found that provision has not been made for measuring the coal consumed by each separate generating set. Also that boilers of widely differing age, evaporative capacity and efficiency are often coupled on to a common steam range supplying several turbines of differing efficiencies and, again, the arrangements for the supply of auxiliary power nearly always represent a complicated system of interconnections between the several generating units.

Problem of Analysis

These stations present a baffling problem to those concerned in the thermal efficiency of their operation, because the permutations and combinations of the different plant items during a given period render it extremely difficult to assess the operating merit of any one station as a whole.

The essential feature of these stations that I desire to emphasize is that, because of interconnections between the separate plant items, it is not possible to deal with the thermal efficiency of any individual generating unit during an extended period of time. The best that can be done is to present a single expression of thermal efficiency for the station as a whole.

In August, 1944, Messrs. R. W. Biles and G. W. Maxfield (both then with the C.E.B.) presented a paper before the Institution of Electrical Engineers entitled "Standards of Performance of Generating Plant Based on Five Years' Operating Data"† in which they put forward what is probably the best and most practical method of analysis for this particular category of station. The method was adopted by the then Central Electricity Board and is still in use by the British Electricity Authority. The authors showed courage in tackling a subject of such complexity and are to be congratulated on having made a valuable contribution to the subject of generation.

Modern Stations

Since then a second category of station design has emerged and has been rapidly developing during the past few years: each generating unit with its complement of boilers and auxiliaries is separated from its neighbours in the same station and is regarded as a separate generating station in itself although it may be housed in a building that is common to others. The input of coal and the output of electricity can be accurately measured and so the thermal efficiency of each unit can be readily determined over any extended period.

Although at the present time stations in this second category are a great deal less numerous than those in the first, the capacity of plant in the individual newer stations is much greater and I am of the opinion that within the next ten years the total output from such stations will be far greater than that of the older and smaller stations. If such proves to be the case then the industry is justified in examining the position to see whether advantage can be taken of the more simple method of design to introduce a better method of expressing thermal efficiency.

In any single expression of thermal efficiency there are three quite separate components which can be enumerated as follows:—

Component "A": the steam cycle efficiency is determined by the selection of the terminal steam and vacuum conditions;

* Lately Divisional Controller, East Midlands Division, B.E.A.

† I.E.E. *Journal*, Vol. 91, Part II, No. 22, August, 1944, pp. 254–276.

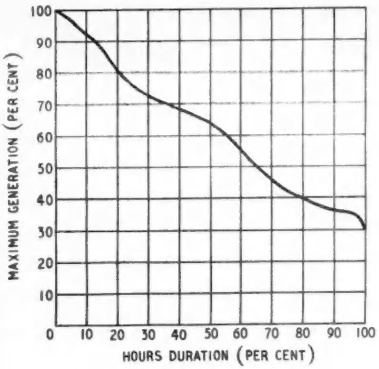


Fig. 1.—Typical load duration curve

also by the employment of the regenerative and re-heat cycles. This component can be calculated exactly and is governed entirely by physical laws. The wit of man cannot alter the steam cycle efficiency, once the terminal conditions are fixed. It is a constant.

Component "B": the coincidence of plant item efficiencies is determined by the designers of the plant items and the designers of the station layout. For any given load on the plant there is a maximum efficiency that can be accurately determined by test. Although the plant item efficiencies vary with the load on the generating unit, the efficiency at any particular load is a constant providing the plant is kept in perfect state of repair.

Component "C": the operation efficiency is determined by two factors, namely, the loading of the plant and the maintenance skill of the operating staff.

We have then three distinct and quite separate groups of men who are responsible for any single expression of thermal efficiency: group "A", the power station designers; group "B", the plant item designers; and group "C", the operating staff.

If modern power station design permits a particular generating unit to be identified with its own thermal efficiency, it appears foolish to continue the use of our present conventional single expression because the single expression obscures the merits of the three groups of men directly concerned in the operation of the plant.

If, then, the steam cycle efficiency of a given plant is, say, 39·65 per cent and the coincidence of maximum plant item efficiencies is, say, 62·4 per cent, I suggest that these two components should at all times be expressed separately thus:—

$$39{\cdot}65\% \times 62{\cdot}4\%.$$

Each component is a constant and the product is the maximum thermal efficiency the plant is capable of achieving. Most power station engineers are aware of the maximum efficiency a given plant is capable of achieving, but few are aware of the split between these two components. The product of the above two constants is 24·74% and if the actual efficiency for the month of September, 1951, is, say, 22·7%, then the operating efficiency will be 91·7 per cent and the expression for the month will be:—

$$39{\cdot}65\% \times 62{\cdot}4\% \times 0{\cdot}917 = 22{\cdot}7\%.$$

With this three-part expression of thermal efficiency the station engineer will fix his attention on the variable component "C" and will desire to determine how much of this factor is due to the loading of the plant which under grid operation is beyond his control, and how much is due to operating practice in the power station that is under his control.

The split between these two components can accurately be determined by the following process:—

(D) Make tests to determine the maximum possible efficiency of the plant at close increments of load throughout the full loading range of the plant; from these values produce a maximum efficiency characteristic curve.

(E) From the station log-book produce a load duration curve (Fig. 1) for the total hours in the month in question.

(F) Summate the maximum efficiencies on each increment of load against the hours run, as shown on the load duration curve, which will then indicate the maximum efficiency the plant could have achieved during the month having regard to the load imposed on the plant.

(G) The difference between the maximum and the actual values will represent the operating component due to factors within the control of the operating staff.

In any attempt to assess the efficiency merits of a power station a very common difficulty arises when for various reasons it is not physically possible to operate under designed conditions. For instance, it may not be possible to maintain the designed

vacuum under drought conditions, or it may not be possible to maintain the designed terminal steam and feed water temperatures at all conditions of load. Again, it may not be possible to maintain the test boiler efficiencies because inferior coal is being delivered.

In all circumstances such as these it is suggested that the basic data on which a plant has been designed should be rigidly adhered to throughout the life of the plant. By adopting this policy attention will be focused upon such defects and there will then be better prospects of defects being rectified.

When the single expression of thermal efficiency is applied to the older stations and relates to operation over a month for several generating units having widely varying efficiency characteristics, defects such as these become obscured and are apt to be accepted. With the ever-rising cost of fuel the premium on thermal efficiency is constantly increasing and there is all the more reason for refusing to accept anything but the designed conditions.

River Wyre Cable Crossing

AN installation recently completed by the British Insulated Callender's Cables organization for the North Western Electricity Board was the laying of two 33 kV 3-core cables and an auxiliary cable across a 1,050yd stretch of the River Wyre estuary at Fleetwood. These cables are for connection to an existing 6·6 kV circuit on the generating station site at Fleetwood and, on the Preesal bank, to an overhead line—also being constructed by the B.I.C.C. organization. The voltage will eventually be stepped up to 33 kV when the Fleetwood power station is completed to cater for heavy loads in the Preesal district.

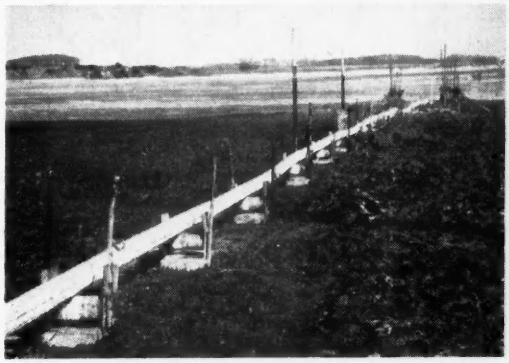
Two 33 kV, 3-core, 0·30 sq in paper insulated, lead-alloy sheathed, single wire armoured cables were installed, and one 10-pair telephone and a single-core 1/·036 sq in v.r.i. lead-alloy sheathed, single wire armoured auxiliary cable. To avoid underwater joints the two power cables were manufactured at the Erith works in single 1,130yd lengths, thereby necessitating the construction of two exceptionally large cable drums ; they were 12ft in diameter by 8ft wide and, complete with cable, each weighed 36 tons. For their transit by road from works to site two diesel lorries with 8-wheel trailers were used, the 250-mile journey taking four days.

The blasting of the trenches in the hard clay river bed was done with charges of the plaster type —laid on the river bed and not embedded in it—fired when there was sufficient depth of water over them.

The usual method of employing a cable-laying barge was impracticable owing to the difficult tides, so the cables were pulled across by winches on the Preesal side from which wire bonds were run across the estuary.

During a neap tide more than half the estuary is flooded, even at low water, but not to an extent which allowed the cable to be floated. To take advantage of the neap tide slack water, therefore, it was necessary to pull the cable at high water with oil-drum floats attached at 9ft intervals. Across the mudflats, cover was provided by digging out progressive lengths of trenches and back-filling the soil over the cable during periods of low tide. This lining up and bedding in was very adversely affected by weather. Consequently it was not possible to begin the second cable laying operation as planned so it was pulled across the estuary on rollers at low tide during the spring tide period. This operation was successfully accomplished within three hours.

The crossing was carried out by the British Insulated Callender's Construction Co. in conjunction with the North Western Electricity Board.



The cable lying on the mudflats in readiness for pulling across the river channel

E.C.A. Conference

Installation of New President

AT the closing session of the Electrical Contractors' Association Conference at Harrogate on Wednesday last week Mr. P. G. Wallis, the president, introduced his successor, Mr. Stanley N. Watkins, assuring the members that Mr. Watkins would worthily uphold the traditions of the Association. He then handed over the emblem of office to Mr. Watkins, although he remained in the chair for the rest of the session.

In acknowledging the honour conferred on him, Mr. Watkins spoke of the strength of the Association and its willing co-operation with other sections of the industry.

Mr. Wallis said that it had not been thought necessary to elect another vice-president in Mr. Watkins's place; Messrs. W. T. Trace and A. F. Plummer continued to serve as vice-presidents. He then moved an "omnibus" vote of thanks to the Mayor and Corporation of Harrogate and their officials, the conference stewards from the West Yorkshire Branch, of whom Mr. W. Hartley was chairman, the authors of the papers, Mr. Penwill and his staff, the electrical Press and others who had helped in connection with the conference.

After the Mayor had replied, Lord Citrine was asked to address the members. He

ON THE PLATFORM AT THE HARROGATE CONFERENCE
1. Lord Citrine. 2. Mr. S. N. Watkins. 3. Mr. A. F. Plummer. 4. Mr. E. R. Sanderson. 5. Mr. W. T. Trace. 6. Mr. L. C. Penwill

At **the garden party : Mr. S. Dickinson, Mr. P. G. Wallis, Miss Wallis and Mrs. Wallis, with Mr. and Mrs. S. N. Watkins at the back**

said that he had read Mr. Wallis's presidential address with great care and found it clear and fair-minded. Congratulating the Association in reaching its golden jubilee Lord Citrine said that when he was in the industry there was practically no security of employment; now conditions had been greatly improved by agreements between the Association and the Electrical Trades Union. If the present seemed a troubled time remembrance of past difficulties would put matters in proper perspective.

He quoted figures of the continuing advance in electricity consumption to show that there would be no lack of work for contractors, manufacturers and all concerned with the industry. The B.E.A. had to contemplate 35,000 MW of plant in the next twenty years. He considered that the E.C.A. was nearer realization of its ideal and objects than ever before.

Lord Citrine mentioned that he had endeavoured to secure a collaborative scheme of apprenticeship among the Liverpool contractors about thirty years ago. He concluded with a reference to the proposed National Inspection Council which, he said, would ensure good work and eliminate the unqualified.

Mr. E. Buttner, of the National Electrical Contractors' Association of America, said he brought congratulations from his Association to the E.C.A. on its golden jubilee. He outlined the structure and operation of the American Association which, he said, had 3,500 members organized in about 56 chapters. Their objects and problems were much the same as those of the English E.C.A. They had committees for handling labour relations, apprenticeship, an employees' benevolent fund, industrial relations, research and education, technical practice, business administration research and statistics.

The next business was the presentation by Mr. Wallis of a cheque to Mr. Penwill in recognition of his 25 years as director and secretary and 30 years with the Association, subscribed by members of all branches. In thanking the members for their gift Mr. Penwill recalled a few memories of the past from the time when he joined the late Mr. L. G. Tate as his assistant.

Mr. S. Dickinson, immediate past-president, then announced that the Council had decided to recognize the work of Mr. Wallis, Mr. M. R. H. Sadler, chairman of the Executive Committee, and Mr. Armistead Smith, former vice-president and chairman of the Scrutinizing Committee. He then presented each of them with a gold mounted fountain pen set and the three recipients replied.

At the garden party in the afternoon tea had to be served under cover in view of the cool weather but most of the delegates spent some time viewing the remarkable

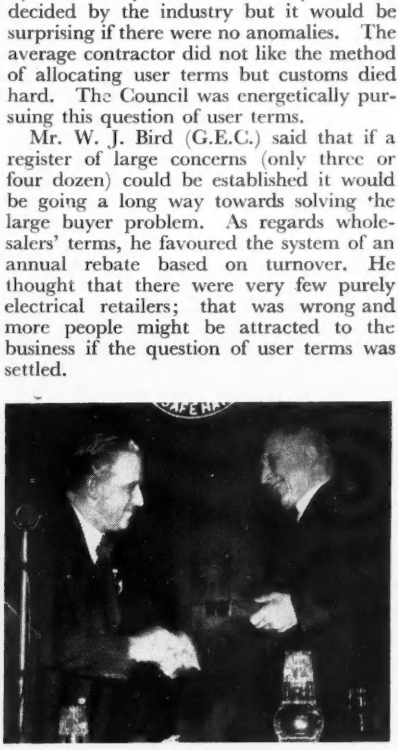
The president hands Mr. Penwill the cheque subscribed by members

show of flowers in the Valley Gardens. The dance which followed a smoking concert in the evening, at the Royal Hall, continued until a very late hour.

Trading Structure

In our last issue we summarized Mr. Penwill's paper on " Some Aspects of the Trading Structure of the Electrical Industry." Eight speakers took part in the discussion, the opener being Mr. A. S. Lowe, secretary to the Electrical Fair Trading Council. Mr. Lowe stressed the point mentioned by Mr. Penwill that the Fair Trading Policy represented only the greatest possible common measure of agreement between the parties involved. He said that the Council was not a body of theorists and economists but men elected by the industry itself. The Policy had been decided by the industry but it would be surprising if there were no anomalies. The average contractor did not like the method of allocating user terms but customs died hard. The Council was energetically pursuing this question of user terms.

Mr. W. J. Bird (G.E.C.) said that if a register of large concerns (only three or four dozen) could be established it would be going a long way towards solving the large buyer problem. As regards wholesalers' terms, he favoured the system of an annual rebate based on turnover. He thought that there were very few purely electrical retailers; that was wrong and more people might be attracted to the business if the question of user terms was settled.



Mr. Dickinson making the presentation to Mr. Armistead Smith

Mr. A. J. Stiling (London) considered that wholesalers should desist from giving trade terms to cash customers except upon the authority of printed order forms from those entitled to terms. He foresaw trouble if overheads were charged as a percentage of the labour cost which he put at from 70 to 80 per cent, compared with an average of about 20 per cent as a charge on material and labour.

Mr. R. Cussins (York) spoke of the serious effect of purchase tax on retail business. He said that private retailers must be prepared to have good showrooms if they were to meet the competition of the Electricity Boards which were opening service centres in all districts. The B.E.A., he contended, was determined to eliminate the private contractor if it could and was charging up its contracting costs to the generating side of the industry. He suggested that the Association should advise members with which manufacturers they should deal; they could use their great buying power to good advantage.

Mr. V. J. Stock (London) said that the contractor did not want to be bothered with " labour only " jobs. He wanted to design the installation and choose the best materials for it. Discounts were already small enough; there was no room for reduction. As to retailing, on a recent order for appliances and domestic equipment valued at £530 there was a gross return of only £40. There was a growing tendency for manufacturers to eliminate the 2½ per cent; that was taking away the retailer's living altogether.

Mr. R. J. Griffin (Leighton Buzzard), representing a solely electrical retailing concern, said that the Association should do more about the retail side. Increased purchase tax, he said, meant more capital tied up and a smaller percentage on turnover.

Mr. S. L. M. Barlow (London) drew attention to an apparent discrepancy in the paper between two statements relating to the purchase of material by customers. He said that the unqualified retailer was selling a large amount of shoddy equipment which was doing the industry no good. Manufacturers should realize how they had benefited from the advice of the electrical contractors.

Mr. A. S. Redvers Pratt (Bradford) said that the trader should enjoy reasonably fair conditions as did labour and the professions.

It was difficult to secure observance of the Fair Trading Policy when there was a lack of sense of right and wrong.

In the course of his reply, Mr. Penwill said he was glad to hear that the Fair Trading Council had the question of user terms in hand, but he pointed out that it was always on a to-morrow which never came that they were to receive benefits. He welcomed Mr. Bird's remarks and particularly liked his advocacy of annual rebates on turnover which would partially solve the problem of quantity discounts. Margins should be studied and if they were not big enough they should be increased. He assured manufacturers that N.E.C.T.A., Ltd., did represent the views of members. There was a case for charging overheads to labour which should be examined. He refused to be drawn on the subject of B.E.A. competition but said that contractors wanted, quantity for quantity, equal terms with their competitors. The buying power of the contractor should be harnessed to the retail business. Because of the incidence of purchase tax and other factors there was an overwhelming argument in favour of increased trade discount. He still maintained that so long as the contractor received the appropriate reward it did not matter if the customer provided the material. There was every justification for restricting retail business to qualified people.

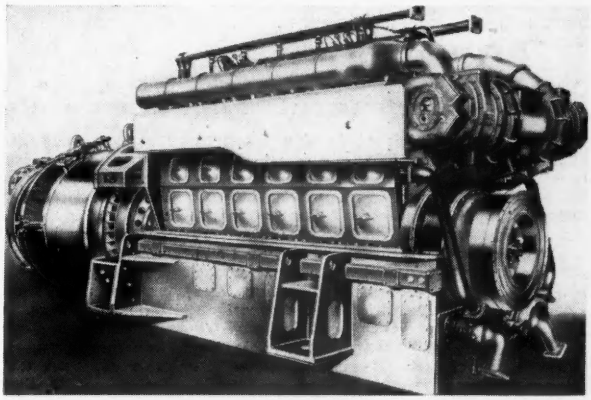
Diesel-Electric Traction

Prototype 15,000 *h.p. Unit Demonstrated at Colchester*

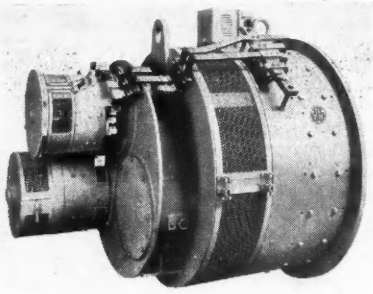
ON a recent visit to the Colchester works of Davey, Paxman & Co., Ltd., we saw demonstrated a 15,000 h.p. engine generator set which has been developed especially for use on the larger diesel-electric locomotives. The combined power unit comprises the engine, main generator, exciter, and one or two auxiliary generators together with engine speed selecting gear and torque control mechanism.

Heavy duty traction service involves certain fundamental requirements in the design of prime mover and transmission. In general, these factors are well-known and embody such considerations as robustness of construction to ensure long life; minimum bulk and weight in view of axial loading and gauge restrictions; ability to maintain good performance over a wide range of operating conditions; and adequate accessibility to minimize maintenance costs. It follows that standard industrial machines can seldom be used satisfactorily for rail haulage purposes but it is desirable in developing traction equipment to exploit the experience gained in other fields, such as submarine installations where some of the foregoing fundamentals are equally applicable. In the present plant the essential requirements of rail haulage have been met to the fullest possible extent.

The diesel engine is a Ruston-Paxman Mark 12 YLXL 12 cylinder Vee-form



Ruston-Paxman 15,000 h.p. prototype diesel-electric power unit with B.T.H. electrical equipment



B.T.H. main generator and auxiliary machines

machine, with a continuous traction rating of 15,000 h.p. at 1,000 r.p.m., which is pressure charged by exhaust gas turbo-chargers on the Buchi system and regulated by a hydraulic servo-governor.

The B.T.H. main d.c. generator is a shunt wound machine and is separately excited from an exciter which has a shunt field winding energized from the locomotive auxiliary supply, together with a differential winding carrying the armature current of the main generator. Its maximum continuous rating is 2,200 A at 850 V. The output of the set is regulated by varying the engine speed and regulating the strength of the shunt field on the exciter while torque control is effected by a servo-hydraulic-operated rheostat also connected in the exciter shunt field circuit.

A simple shunt wound generator with a differential exciter is used instead of a conventional three winding machine and this results in a smaller and lighter generator together with a much lighter control field thereby reducing the size of the torque regulator. A series field winding is also provided on the main generator so that it functions as a motor for cranking the machine during starting.

The auxiliary generator working in conjunction with an automatic voltage regulator provides a constant voltage supply over the whole of the working speed range of the engine, this supply being used for lighting control purposes and for charging the starting battery.

A second auxiliary generator can be provided when required to supply the motor driving the radiator fan. It has a voltage characteristic varying with speed so that the radiator fan speed varies approximately with the diesel engine speed. This arrangement provides for the correct degree of cooling of the engine at all speeds while avoiding the complication of a tapped field fan motor controlled by thermostatic or other means in cases where a mechanically driven fan is impracticable.

At a luncheon after we had inspected the engine, Sir John Greaves, managing director of Davey, Paxman & Co., Ltd., said that his company, in common with all other British diesel engine manufacturers, was at a great disadvantage in trying to get into the export market because, unlike their American competitors, there was no real call for diesel traction on our home railways. There was a large international market for diesel traction engines and British electrical traction equipment but unless they could get a great deal more track running experience than they were getting at the present time it was going to be increasingly difficult to compete with the Americans.

Instrument Maintenance Courses

THE City and Guilds of London Institute announces the adoption of a new scheme of courses and examinations in instrument maintenance, which has been drawn up by an authoritative Advisory Committee including representatives of industry, the Society of Instrument Technology, the Ministries of Supply, Fuel and Power, and Education, the Service Departments, major engineering professional institutions, and associations concerned with technical education. The scheme is intended to meet the needs of mechanics and technicians concerned in the maintenance, repair and installation of the instruments used for process and production control in industrial plants and in H.M. Forces. The course of part-time study is of five years duration, with an intermediate examination at the end of the third year, and a final examination at the end of the fifth year. There is provision for students holding an appropriate ordinary national certificate to enter the course at the beginning of the fourth year. Courses to be provided under the new scheme will be held in technical colleges. A pamphlet containing the regulations and syllabuses for the City and Guilds examinations will be available shortly, price 6d, from the C. & G. Department of Technology, 31, Brechin Place, London, S.W.7.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority announces with regret the decision of **Mr. H. F. Carpenter,** F.C.I.S., F.S.A.A., to relinquish his appointment as secretary to the Authority in the autumn on reaching superannuation age (60 in his case). The four years during which Mr. Carpenter has filled this post have been the particularly difficult and vitally important formative period of the new nationalized electricity supply service. He has discharged his responsibilities with outstanding ability and the Authority hopes to have the continued benefit of Mr. Carpenter's valuable experience in another capacity.

Mr. H. F. Carpenter

Mr. Carpenter was educated at Bancroft's School. He joined the staff of the Metropolitan Water Board in 1908 and was with the Board for 18 years, apart from war service in Gallipoli, Egypt and Palestine. On the formation of the West Midlands Joint Electricity Authority in 1926 he became one of the two principal officers, with the title of secretary and treasurer (later altered to clerk and treasurer). After the death in 1938 of Mr. E. F. Hetherington, the chief engineer and manager, Mr. Carpenter was appointed clerk and manager and retained that position until he became secretary to the B.E.A.

In 1947 Mr. Carpenter was president of the Chartered Institute of Secretaries and also chairman of the E.D.A. Council. In the former capacity he visited Australia and New Zealand in connection with the fusion with the Chartered Institute of Secretaries of the two organizations serving the professional interests of secretaries in Australasia. The tour included Canada where he visited branches of the C.I.S. In 1948 Mr. Carpenter was appointed a member of the reconstructed E.D.A. Council, and in 1949 he was nominated as official representative of the B.E.A. on the Council of the Electrical Research Association.

The Minister of Fuel and Power has appointed **Mr. L. V. Turner,** M.I.E.E., of Taunton, to be a part-time member of the South Western Electricity Board in place of the late Mr. Frank Forrest, C.B.E., M.Inst.C.E., M.I.E.E., M.I.Mech.E. As we reported in our last issue, Mr. Turner has retired from the post of Taunton Sub-Area manager of the South Western Electricity Board.

Mr. E. H. Hickery, B.A., of Risca, Monmouthshire, has relinquished his appointment as a part-time member of the South Wales Electricity Board.

Mr. I. A. R. Stedeford, chairman of Tube Investments, Ltd., left Britain by air on 3rd June for business consultations in Canada and the United States. He will return to Britain within about fourteen days.

Mr. J. Morison has been appointed deputy manager of the Newcastle branch of the Simplex Electric Co., Ltd.

Mr. W. S. Burge, M.I.E.E., controller of the East Midlands Division of the British Electricity Authority, retired on 31st May. As we have already reported he is succeeded by **Mr. L. F. Jeffrey,** B.Sc., M.I.Mech.E., M.I.E.E., M.Inst.C.E. formerly chief generation engineer (construction), Midlands Division.

Mr. W. S. Burge

Mr. Burge, in the early part of his career, gained experience in the manufacture, erection and operation of power station plant with C. A. Parsons & Co., Ltd., Dick, Kerr & Co., the B.T.H. Co., A. Reyrolle & Co., Ferranti, Ltd., and the Electricity Departments of Wakefield and Southampton Corporations. After service with the Royal Engineers in the 1914-18 war he joined the English Electric Co., Ltd., and specialized in steam turbine work. He visited the United States in 1926 as a member of the steam turbine panel of the International Electrotechnical Commission, and again in 1928 on behalf of the English Electric Co. In 1930 Mr. Burge was appointed operation engineer with the Central Electricity Board in the South East England District, being promoted to deputy manager in 1940, and two years later becoming manager of the

Central England District. On nationalization he was appointed controller of the East Midlands Division of the B.E.A. He was chairman of the South Midland Centre of the Institution of Electrical Engineers for 1947-48. Communications should be addressed to Mr. Burge at "Throughts Gardens," Priory Lane, Bishops Cleve, near Cheltenham, Glos.

Mr. Stanley N. Watkins, the new president of the Electrical Contractors' Association, is a Birmingham man born in 1892 and educated at King Edward's Grammar School, Aston. He received his practical training with Knight & Ludlow, Ltd., Birmingham, and at the Rugby works of the B.T.H. Co. During the 1914-18 war he was engaged at a nitrogen-fixation research establishment. His connection with the E.C.A. began in 1921. Since then he has been chairman of the Birmingham Branch and chairman of the Midland Sectional Board (on which he has served since 1933). He was elected to the Council in 1938 and became a vice-president in 1949.

Mr. S. N. Watkins

In our issue of 11th May we reported the retirement of **Mr. Frank Nicholls** from the managership of the No. 4 (Leeds) Sub-Area of the Yorkshire Electricity Board. In the accompanying picture we show Mr. W. M. Lapper, chairman of the Board, presenting Mr. Nicholls with a cheque on the occasion of his retirement.

Mr. W. M. Lapper presenting a cheque to Mr. Frank Nicholls on his retirement

At the celebration of the centenary of the foundation of Owens College, held at the Manchester University on 31st May, **Mr. L. H. A. Carr,** M.Sc.Tech., M.I.E.E., consulting engineer to the Metropolitan-Vickers Electrical Co., Ltd., as a representative of Convocation on the Court of Governors of the University, was among those present at the Congregation at which the Queen received the honorary degree of LL.D., and also at the lunch which preceded the function, at which Her Majesty was the principal guest.

Mr. Miles Beevor, at present chief secretary to the British Transport Commission, has been appointed deputy managing director of the Brush Electrical Engineering Co., Ltd. He takes up his new appointment at the beginning of July.

The General Electric Co., Ltd., announces the appointment of **Mr. W. A. C. Maskell,** B.Sc.(Eng.), M.I.E.E., as general manager of the company's radio and television works at Coventry, in succession to the late Mr. W. H. Peters. Mr. Maskell joined the G.E.C. as a graduate apprentice in 1925, and after a period as an assistant in the radio laboratory at Coventry, was appointed to the staff at head office. During the war, he was chief engineer of the G.E.C. radio works in the Bradford area, and when the works closed in 1946, returned to head office, to become deputy manager of the Radio Department, under Mr. M. M. Macqueen. The position of deputy manager of the Radio Department is being filled by **Mr. R. G. E. Mayo,** who joined the G.E.C. in 1927. Mr. Mayo has held various appointments in both the radio works and the sales branches of the company, and was transferred to head office in 1946 as assistant manager, radio and television sales.

Mr. W. A. C. Maskell

Mr. V. Bowen, A.C.I.S., A.A.C.C.A., senior assistant secretary of the North Western Division, British Electricity Authority, has been appointed secretary of the No. 7 Sub-Area of the North Western Electricity Board. Mr. Bowen commenced his career with the Salford Corporation Electricity Department in 1920, in which he became chief administrative assistant in December, 1945. In February, 1948, he was appointed as executive officer of the Salford undertaking but relinquished this post on appointment to his position with the North Western Division.

Claude General Neon Lights, Ltd., a subsidiary of the General Electric Co., Ltd., recently celebrated its twenty-first birthday by a series of parties for the staff and work-people. The accompanying picture shows Mr. S. D. Moyse, managing director of Claudegen, with Mrs. Moyse receiving Mr. and Mrs. S. C. F. Allen at a London party.

Mr. S. D. Moyse (managing director of Claude General Neon Lights, Ltd.) and Mrs. Moyse receive Mr. and Mrs. S. C. F. Allen at a London party to celebrate the company's twenty-first birthday

Mr. H. J. Fortune, B.Sc.(Chem.), A.R.I.C. station chemist, Taylors Lane (Willesden) generating station, London Division of the British Electricity Authority, has been appointed divisional chemist of the London Division and took up his new duties on 1st June.

During their tour of the Festival of Britain "Farm and Factory" Exhibition at Castlereagh, Belfast, last Friday H.M. the Queen and Princess Margaret showed great interest in the all-electric "Farm of the Future" and its up-to-date farmhouse. On this occasion the Queen greeted Dame Caroline Haslett, a vice-president of the British Electrical Development Association and Dame Caroline presented to Her Majesty Mr. C. T. Melling, chairman of the E.D.A. Council, and Mrs. Melling. Mr. E. R. Wilkinson, immediate past-chairman, and Mrs. Wilkinson, and Mr. V. W. Dale, general manager and secretary of E.D.A., and Mrs. Dale.

A repeat performance of their musical show "Ferry Boat Inn" was given recently by members of the staff of **W. T. Glover & Co., Ltd.** Members of associate companies and people connected with the industry were invited to see this show.

WILLS

Mr. J. H. Haws, M.I.E.E., Norton-on-Tees, Durham, for many years electrical manager of the Billingham Division of Imperial Chemical Industries, Ltd., who died on 28th October last, left £8,431 gross (£7,554 net).

Mr. J. H. Johnson, M.I.E.E., for many years with Crompton & Co., Ltd., and Crompton Parkinson, Ltd., editor for a number of years of the "Electrical Engineers' Year Book," who died on 5th December last, left £6,820 gross (£6,724 net).

Mr. H. H. Parker, Pudsey, Yorks, formerly district manager for the Yorkshire Electricity Board and previously for many years borough electrical engineer of Pudsey, who died on 2nd February last, left £868 gross (£796 net).

Mr. H. J. Carter, managing director of the Carter Electrical Co., Ltd., who died on 12th February last, left £8,561 gross (£7,733 net).

Mr. P. J. Wildsmith, Ringwood, Hants, retired electrical engineer, who died on 2nd December last, left £2,195 gross (£2,143 net).

Mr. P. A. Mole, managing director of M. Mole & Son, Ltd., electrical stamping manufacturers, who died on 26th November last, left £81,949 gross (£73,218 net).

Major G. H. Peake, M.A., LL.B., J.P., Thirsk, Yorks, a former chairman of the Yorkshire Electric Power Company, who died on 11th October last, left £240,910 gross (£236,337 net).

Mr. E. D. C. Owens, A.M.I.E.E., a former manager of the Cardiff and Swansea offices of the British Thomson-Houston Co., Ltd., who died on 30th November last, left £5,827 gross (£5,728 net).

Mr. A. Holmes, Tadworth, Surrey, formerly manager of the London sales area of Siemens Electric Lamps & Supplies, Ltd., who died on 5th February last, left £1,504 gross (£1,462 net).

Mr. T. P. Easton, former general manager of the Newcastle-on-Tyne transport and electricity undertaking, who died on 2nd February, left £1,343 gross (£1,258 net).

Mr. M. A. Wills, late senior assistant engineer in the Transmission (Construction) Department, North Western Division of the British Electricity Authority, who died on 28th January last, left £3,773 gross (£3,596 net).

Joint Engineering Conference

THE Joint Engineering Conference which is being held at the Institutions of Civil, Mechanical and Electrical Engineers in London (4th to 15th June) was officially opened at the Institution of Civil Engineers on Monday of this week by Mr. Richard Stokes, Lord Privy Seal. The conference was to have been opened by Viscount Addison, Lord President of the Council, but he was prevented from doing so by ill-health.

In welcoming the delegates to this opening meeting, which was also attended by many overseas visitors, Mr. Stokes appealed to engineers to help the country overcome the difficulties created by the shortage of materials. What we needed, he said, were alternatives as many raw materials, particularly the rarer metals, would not be available in quantity for a long time to come. In conclusion he spoke briefly on the achievements of engineers and said that the results were both formidable and attractive. This might form either a basis for the salvation of the peoples of the world or lead to disaster.

When as chairman of the meeting Dr. W. H. Glanville, President of the Institution of Civil Engineers, introduced Mr. Stokes, he explained that the purpose of the conference was to record the contributions to the advancement of civilization made by British engineers and scientists during the past hundred years and said that this would not only provide a valuable historical record but would be a challenge to all our young engineers.

In proposing a vote of thanks to Mr. Stokes, the President of the Institution of Mechanical Engineers, Mr. A. C. Hartley, spoke briefly of the contributions which had been made to mechanical engineering since 1851. The motion was seconded by Sir Archibald J. Gill, President of the Institution of Electrical Engineers, who said he represented the youngest of the three Institutions and indicated the increasingly rapid advances which were being made in electrical engineering and the impact it was having on civilization.

Activated Rosin-Cored Solder

ROSIN, although possessing the non-corrosive qualities essential to a soldering flux for electrical purposes, has only limited cleaning and wetting properties. A more vigorous fluxing action, through the addition of a non-corrosive medium which is soluble in rosin, is claimed for "Superspeed" cored solder, which was originally developed by H. J. Enthoven & Sons, Ltd., to meet a war need. This finds its principal application in telecommunication apparatus, in which numerous reliable joints are required to be made in much less time and with, perhaps, less well cleaned surfaces than when rosin alone is used.

Particulars of its manufacture and varied applications were demonstrated in a film with commentary entitled "The Vital Link," which received its first showing at the Dorchester Hotel, London, W., on 29th May. It illustrated, among other things, the testing of lead and tin, the preparation of a billet of the metal, the extrusion of tubes of solder from it, the reduction of diameter by drawing through a series of carbide dies and the winding on small reels. A notable feature is the stellite form of the core which has six radiating flutes.

De-Frosting Experiments

AT the St. Ives Board of Greenkeeping Research Station at Bingley experiments have been carried out with electrical soil-warming equipment with a view to keeping turf soft in the frostiest weather, and the results of experiments during the last three winters, in which the General Electric Co., Ltd., has given assistance, have just been announced. The tests provide a solution—although somewhat costly—for the prevention of a frost-bound football ground. They have been carried out with low voltage soil warming on a number of experimental areas at the research station which were allowed to freeze up to a depth of 4–5in before soil warming was applied. In spite of continued frost, less than two days' warming was sufficient to produce soft turf which remained soft for at least another ten days of frosty weather without further warming.

The estimated cost of equipment required to provide adequate protection against frost for a full-size Association football pitch is about £10,000, for a Rugby football pitch about £7,000, and for a greyhound racing track about £1,200. A detailed technical report is being sent to those sports controlling authorities who have co-operated during the investigations.

Engineering Education

THE Regional Advisory Council for Higher Technological Education, London and Home Counties, Tavistock House South, Tavistock Square, London, W.C.1, has published a third edition of its pamphlet on engineering education in the Region (price 1s). This summarizes the facilities available at all levels from secondary technical schools to courses for the higher degrees of London University. It is stated that in 1948–49 there were 12,180 students of engineering in London and the Home Counties. Over ten pages of the pamphlet are devoted to details of the courses offered by institutions in various branches of engineering including electrical engineering, electrical installation work, telecommunications, welding and boiler house practice.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Plug Protection

A CONTRIVANCE is very much needed for protecting the plug connectors of household appliances when the outlet sockets are fitted on to the skirting boards. Even flush and metal-clad sockets, or switched sockets, leave the plug top vulnerable.

A determined Mrs. Mop, pushing beds and armchairs around, will somehow negotiate a quarter-inch switch dolly projection, but the usual kinds of Bakelite sockets and switched sockets are just so many ready-made targets. I have myself on many occasions attached a short piece of 2 by 1in wood, screwed on endways alongside the plug outlet, which has afforded a fair measure of protection, particularly to bedside plugs, but the arrangement is not particularly neat.

What I think might meet the case is a form of open-fronted metal shroud, cast or pressed, with at least three fixing screws. It should project 2 or 2½in and be of sufficient size to surround most normal types of plug. The shroud could be semi-circular for round sockets and rectangular for the square base type, with one side open to leave the flexible connector free. All edges would need to be well rounded so that the "flex" could not be rubbed.

As a shroud of this description would not be dependent on the type or make of plug and could be fitted by anybody, it should sell in large quantities which probably should enable it to be made reasonably cheaply.

Sutton, Surrey. A. BROWN, B.Sc., Associate I.E.E.

Power Station Efficiencies

I FEEL that Mr. F. Stevenson, in his article (18th May), has used two rather unfortunate figures in his calculations which may lead the unwary beginner astray.

First, I believe that simplification is not a good enough reason to warrant the use of the impossible temperature of 32 deg F for the hotwell. Secondly, the choice of 212 deg F for the economizer outlet temperature may lead the beginner to believe that there is some connection between the economizer outlet temperature of water under a pressure somewhat in excess of 300 lb/sq in and the boiling point of water at atmospheric pressure.

Nottingham. J. E. HARRIMAN.

Hotplate Interchangeability

I HAVE been expecting a cooker manufacturer to answer "Ich Dien" and Mr. V. W. Dale on hotplate interchangeability but as no letter has appeared may I take it upon myself to point out a very simple fact known and used by electricians all over the country?

The four-hole fireclay distance piece is easily removable, and the pins (one, two or three) can be placed in any position to suit the type of cooker. What further interchangeability does "Ich Dien" want?

Canterbury. P. R. S. MAY, *Journeyman Electrician.*

Appeal for a Good Cause

THE Electrical Trades' Commercial Travellers' Association is running a general merchandise stall at the garden party promoted by the London and Home Counties U.C.T.A. which is being held in the grounds of the Royal Commercial Travellers' Schools, Hatch End, Middlesex, on Saturday, 23rd June. As our Association will be representative of the electrical industry, I am most anxious that our efforts shall compare favourably with those of other Travellers' Associations taking part in this very deserving cause.

To do this we require the fullest support from the electrical trade in the way of contributions of merchandise. I am indebted to all those friends who have responded so generously to our appeals, but we do need more help if we are to make a really worthwhile effort. I make a special appeal to all members of our industry, who have not as yet contributed, to give us their wholehearted support. In addition to electrical products, we are in particular need of more

home-made garments, fancy needlework, etc., and here is an opportunity which I am sure will appeal to many of our ladies. I would stress that no gift is too small—none too large.

Gifts should be sent to our hon. charity steward, Mr. S. Johnson, 4, The Firs, Lawrie Park Avenue, Sydenham, S.E.26 (SYD 6226), who will acknowledge all contributions. Mr. Johnson will be happy also to supply admission programmes, which are available at 1s each, and I trust that many of our friends will be able to join us at Hatch End on 23rd June.

I look forward with confidence to a generous response to this appeal, and offer my sincere thanks in anticipation.

London, W.C.2. H. A. DEACON,
President,
Electrical Trades' Commercial Travellers' Association.

[A broadcast appeal for funds for the Royal Commercial Travellers' Schools is to be made by Lord Macintosh in the Home Service on 8th July (8.25 p.m.).—Editors, *Electrical Review.*]

Professional Engineers

IN the last issue (12th March) of the *Electrical World* to reach me is an interesting editorial on " How to get Engineers " which has a close bearing upon correspondence from time to time in your columns. The last sentence of this editorial reads, " Perhaps the time is ripe for a little soul searching by engineers who are also employers."

The question is, how many engineers are really employers? Few engineers appear to have abandoned pure engineering for the higher realms of administration. All credit to the non-engineers for their rise to the position of " Boss," but can they be blamed for tarring all engineers with the same brush, whether professional, chartered, electrician, fitter, or boilermaker?

I am in full agreement with your correspondent in Ceylon who suggests (23rd March) some other nomenclature for professional engineers which could be accepted by all as the hall mark of professional status, then perhaps the following sentence in the same editorial may become fact, " There is no reason why engineers should not be in the same income or salary bracket as doctors or lawyers."

As long as the word " engineer " is used it is doubtful whether the administrative gentlemen, as a body, will ever differentiate between a trade and a profession connected with anything loosely termed engineering, irrespective of what fancy description precedes the word engineer, or what letters follow the engineer's name.

Tanga, Tanganyika. G. M. DUNBAR.

Tariff Standardization

YOUR correspondent Mr. Cobbold raises his voice on a topic which vexes us all—increased electricity costs—but I cannot agree that the old domestic tariffs were inducive to improving the domestic load factor.

The trouble is that there has been no national policy for treating this load with the respect that it demands. Many schemes have been put forward including those seen in operation by the Productivity Teams but all seem to have fallen on deaf ears.

Old customs die hard, as has been proved by load shedding, and no amount of tariff concessions except those precluding the use of domestic electricity will have much effect. We will still go along the same path until someone decides to put the picture in its right perspective and tackles the problem energetically from a national standpoint.

Almondsbury, Glos. A. R. S. GOUGH.

Water Heating

WITH regard to Mr. S. F. Bickell's letter (25th May) concerning the announcement of a water heater with an efficiency of 140 per cent, I recently wrote to a firm asking if they would guarantee the boiling time quoted and they replied: " We state in our leaflet that the heater will produce 1¼ pints of boiling water in 60 seconds, a statement made on the results of many tests made in our experiments, but quite obviously without carrying out the tests under conditions existing in Leeds it would be foolish to make such a binding guarantee as you mention."

As Mr. Bickell asks, where is this nice hot water supply of 103 deg F obtained? Even in Leeds, where we can do a lot of very wonderful things, the Corporation Water Department does not supply water at nearly bath temperature, nor have we yet been able to obtain 100 per cent efficiency let alone about 140 per cent.

Roundhay, Leeds. D. H. S. SANDERSON, A.M.I.E.E.

275 kV Cable

Single-Core Impregnated Pressure Type

A POWER cable which has been designed for operation at 275 kV under conditions to be expected on the B.E.A. super-grid system is now in process of manufacture at the Erith Works of British Insulated Callender's Cables, Ltd.

This single-core cable is of the impregnated pressure type for operation under a nitrogen gas pressure of 200 lb/sq in, to suppress ionization and so permit operation at greater electrical stresses than those used in solid type cables. This single length of cable has been designed to operate at a maximum stress at the conductor of 110 kV/cm under working conditions; its principal dimensions are as follows:

	Radial thickness (in)	Cumulative diameter (in)
Conductor (0·75 sq in) died-down and screened with metallized paper	—	1·119
Insulation	1·005	3·129
Metallized paper screen ..	0·005	3·139
Copper woven fabric tape ..	0·015	3·169
Clearance	0·035	3·239
Lead sheath	0·120	3·479
Cotton bedding for reinforcement	0·010	3·499
1% tin-bronze reinforcement	0·036	3·571
Rubber-bitumen sandwich serving	0·21	3·99

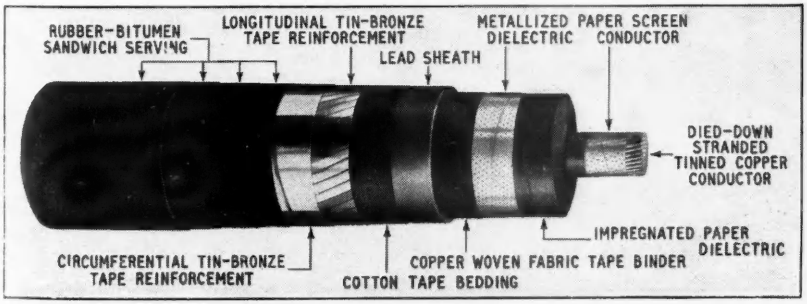
The conductor consists of 91/·103in tinned copper wires and is died-down and screened with metallized paper tapes for the purpose of making the conductor more nearly cylindrical and so reducing the electrical stress concentration which would otherwise exist at the small radii of the individual wires.

The application of the insulation requires the lapping of about 230 tapes of high quality paper. This process is carried out by what is believed to be the largest paper lapping machine in Great Britain but, even so, two passes through the machine are necessary. A copper woven fabric tape is applied over the dielectric screen to protect it and ensure positive contact with the lead sheath. After the paper has been applied the cable is vacuum dried and impregnated with a high grade insulating oil under controlled pressure and temperature conditions.

The next operation is the extrusion of the sheath on to the cable. The lead used contains a small percentage of tin, extensive tests having shown this to be the most suitable alloy for this type of cable. The process is carried out by using the Glover press technique, a small predetermined clearance being left under the sheath to permit the distribution of gas along the length of the cable after installation.

To limit distention of the lead sheath by the internal gas pressure of 200 lb/sq in, special metallic reinforcement tapes are applied in two layers. The first are narrow

Single-core B.I.C.C. 275 kV power cable



tapes with a very long lay to provide longitudinal reinforcement; the second consists of a double layer of wider tapes applied with a short lay to impart the necessary circumferential strength. For a single-core cable the reinforcement must be of a non-magnetic material, so 1 per cent tin-bronze has been selected because of its superior tensile strength and relatively high electrical resistance which minimizes the induced losses.

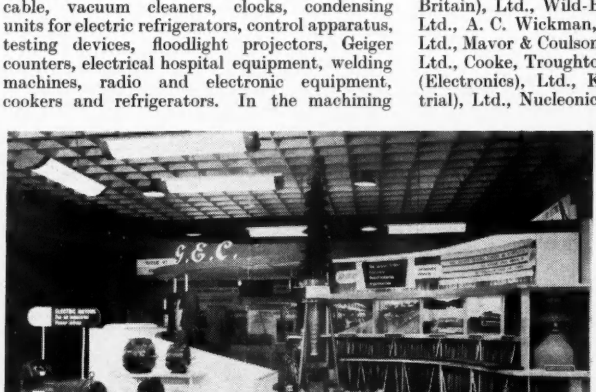
Finally, the cable is served with a rubber-bitumen type finish consisting of layers of rubber and compounded fabric tapes which, together with the application of a bitumen type compound, afford a considerable degree of protection against corrosion.

The continuous current rating of this cable when installed direct in the ground under normal conditions will be 530 A, which will correspond to a three-phase load of approximately 250 MVA.

The cable will be subjected to a comprehensive programme of tests in the company's research laboratories to prove its suitability for the service for which it is proposed. Although this is the first cable manufactured by B.I.C.C. for 275 kV operation, similar cables for 220 kV and 264 kV have been manufactured previously so that no very new problems are involved.

The Toronto Fair

THE Canadian International Trade Fair which opened in Toronto on 28th May is substantially bigger than last year. Great Britain is once again the major exhibitor, occupying 70,000 sq ft of space. There are twelve industrial groups, and electricity in one form or another plays a part in most of them. In the electrical tools, motors, and supplies sections there is a representative display of electrical equipment for the plant, home or laboratory, the range including air circulating equipment, domestic appliances, battery chargers, blowers, cable accessories, many types of cable, vacuum cleaners, clocks, condensing units for electric refrigerators, control apparatus, testing devices, floodlight projectors, Geiger counters, electrical hospital equipment, welding machines, radio and electronic equipment, cookers and refrigerators. In the machining and plant equipment section there is a combined exhibit by the Association of British Machine Tool Makers and the Machine Tool Trades Association, and also a joint effort by the British Federation of Hand Tool Manufacturers and the National Federation of Engineers' Tool Makers. Among the individual exhibitors are Smiths English Clocks, Ltd., the Goblin Electric Cleaner Co., Ltd. (representing the British Vacuum Cleaner & Engineering Co., Ltd.), Allen West & Co., Ltd., Coventry Gauge & Tool Co., Ltd., Hilger & Watts, Ltd., E. H. Jones (Machine Tools), Ltd., Kerry's (Great Britain), Ltd., Wild-Barfield Electric Furnaces, Ltd., A. C. Wickman, Ltd., Edgar Allen & Co., Ltd., Mavor & Coulson, Ltd., Invicta Electrodes, Ltd., Cooke, Troughton & Simms, Ltd., Fielden (Electronics), Ltd., Kelvin & Hughes (Industrial), Ltd., Nucleonic & Radiological Developments, Ltd., Everett, Edgcumbe & Co., Ltd., H. Tinsley & Co., Ltd., Southern Instruments, Ltd., the British General Electric Co. (Canadian), Ltd. (a subsidiary of the General Electric Co., Ltd.), British Electric Resistance Co., Ltd., Streamline Filters, Ltd., and the Telephone Manufacturing Co., Ltd.



The stand of the British General Electric Co. (Canadian), Ltd. (a subsidiary of the G.E.C.), at the International Trade Fair, Toronto

The Plastics Industry

Convention and Exhibition at Olympia

FROM the diversity of the items on view at the British Plastics Exhibition now being held in the National Hall, Olympia (6th–16th June), the visitor gains a good impression of the ever-increasing extent to which plastics are being used, particularly in the electrical industry. Every leading firm and all kinds of materials, types of plant and varieties of plastics fabrication are represented. Concurrently with the exhibition the British Plastics Convention is being held in the same hall. This has been organized by a committee on which are represented the British Plastics Federation, the Plastics Institute, the Polymer Group of the Society of Chemical Industry and *British Plastics*, which is sponsoring the whole exhibition and convention.

Overseas Interest

As this is Festival of Britain year both exhibitors and convention speakers have been confined to British products and technical advances, thereby making the occasion a sort of "Festival of Plastics." The appeal, however, is international and industrial representatives and trade buyers from overseas are attending in large numbers. In addition, the scope of the exhibition and convention has been deliberately designed to appeal to three types of visitor: technologists within the industry, users of plastics and the general public.

For the first group, which also includes moulders, fabricators and sales personnel, all available materials, plant and processes are being shown, and during the convention, which includes some 36 papers, the morning sessions are devoted to papers of importance to this group. For representatives of other industries who use or could with advantage use plastics materials or products in their equipment or processes, every effort has been made to stimulate further interest in their industries and a selection of such industries, such as textiles, building and packaging, are treated in detail in the afternoon sessions of the convention.

Many exhibitors have designed their stands and displays with the layman in mind. The general public are also catered for by a daily programme of films and by a special session, "Housewives' Quiz" where they may put questions to a team of speakers with Mr. Kenneth Horne acting as "Quiz Master." A further exhibit of interest to the public portrays "Plastics: Design and Use," which tells in simple terms the story of plastics. This feature, which is sponsored by the Council of Industrial Design, the British Plastics Federation and *British Plastics*, describes the properties, processes and applications of the chief plastics materials. Another item of importance is the special feature, "Certification Marks for Plastics," which is sponsored by the present licensees of the mark. This display shows both the registered mark and the range of products which carry it.

Technical Sessions

The convention was opened on Wednesday by Sir Ben Lockspeiser, K.C.B., F.R.S. At the first technical session held yesterday (Thursday morning), three speakers were to deal with the progress in plastics materials, while in the afternoon two papers were to be read on the applications of plastics in the chemical and allied industries. This morning's session is concerned with vinyl formulation and compounding, and this afternoon two speakers will deal with plastics in the textile industry. To-morrow there will be a discussion on buying and selling. On Monday next, apart from a session on true synthetic fibres, two particularly interesting papers are to be presented on plastics in building and architecture. On Tuesday the "Housewives' Quiz" is to be held and three papers reviewing the development in synthetic resins are to be presented.

The programme arranged for Wednesday should prove of particular interest to electrical engineers. In the morning Mr. J. Brown will speak on plastics calendering and discuss the various types of machines and layouts, and Mr. E. G. Fisher is to

deal with dyes and take-off systems for thermo-plastic extrusion. The session will conclude with a paper by Mr. E. Gaspar discussing the basic features influencing the performance of injection moulding machines. The afternoon session is concerned with plastics in the transport industries. The first paper by Mr. A. A. Tomkins will deal with plastics in electrical engineering for the automobile industry while others will deal with aircraft plastics structures and plastics in ship construction.

The subjects arranged for Thursday's sessions are techniques of fabrication and the applications of plastics in surgery and medicine, while on the concluding day of the convention, Friday, 15th June, there will be sessions on plastics film production and handling and the use of plastics for packaging purposes.

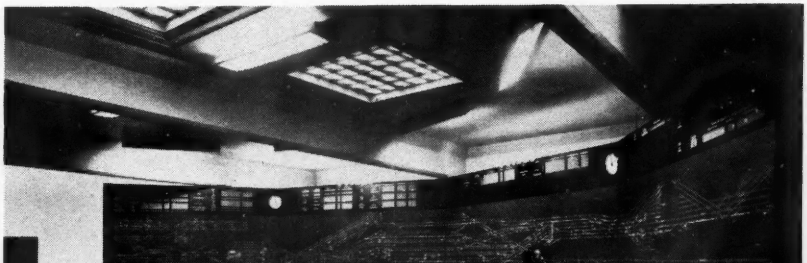
Admission to the convention is by ticket only which may be obtained free on application (specifying sessions) to *British Plastics*, Dorset House, Stamford Street, London, S.E.1.

Railway Signalling

New Installation at York

A NEW signalling installation, adding considerably to the extensive power-signalling already in use in the North Eastern Region of British Railways, has recently been brought into operation at York. This route relay interlocking scheme is housed in one signal box and displaces eight mechanically-operated signal boxes having originally 867 levers between them and controlling the lines from points over four miles south and west to one mile north of York. The installation also links up with existing colour light signalling (partly automatic) between Skelton signal box, 1¼ miles north of York and Darlington South signal box, a route mileage of over 44 miles and the longest continuous section of colour light signalling in the British Isles, comprising three and four tracks for the greater part of the distance.

Altogether the resignalling covers 33¼ track miles, and 317 track circuits indicate the presence of trains and control the signalling. Apart from this 79 three- or four-aspect colour light signals have been installed, 74 being controlled from the new signal box. Of these, 65 have subsidiary signals and 43 are fitted with route or junction indicators. For shunting movements 154 subsidiary signals are provided



Main control panel in the signal box at York

and there are 157 sets of points (including 15 switch "K" crossings) operated by 277 point machines.

The operational requirements of this intricate junction station have necessitated the provision of a total of 827 separate routes, and the concentration of the control of these routes into one signal box makes the installation the largest of its kind in the world.

The control console in the signal box is designed for operation by four men only, their activities being directed and co-ordinated by a traffic regulator. The panel is furnished with an illuminated track diagram with route switches and colour light signal control switches with indicating lamps to show the condition of the track, points and signals at any instant. Mounted on top of the signal panel are the various display units for the train description apparatus which gives a description of each train in relation to the signal which it is approaching.

The main contractors for the signalling work were the Westinghouse Brake & Signal Co., Ltd., while the train description apparatus was designed and installed by Standard Telephones & Cables, Ltd., which will also provide and install the final telephone system to the design of the signal and telecommunications engineer. A temporary system has been installed by the signal and telecommunications department for the first few months.

Mr. C. Carslake, when signal and telegraph engineer of the North Eastern Area, L.N.E.R., was responsible for the preparatory and initial work on the scheme, which has been completed and brought into use under the responsibility of Mr. J. H. Fraser, signal and telecommunications engineer, North Eastern Region, British Railways. The whole scheme, which has cost over £500,000, has been designed to meet the requirements of the former superintendent of the North Eastern Area of the L.N.E.R., and later the divisional operating superintendent, North Eastern Region, British Railways.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Commons on 31st May Sir Hartley Shawcross, President of the Board of Trade, told Mr. Nabarro that United Kingdom exports of electrical generating sets and generators (including parts) during the year 1950 amounted to £16,357,000, and during the first four months of 1951 to £4,075,000; the value *pro rata* for the full year 1951 of these exports was £12,226,000.

Mr. Nabarro asked, in view of the devastating effect of power cuts on industrial production, arising primarily from a shortage of generating equipment, if the time was not now propitious to reconsider the whole of our policy in the export of this vital type of equipment.

Sir Hartley Shawcross replied that the question was constantly under review—both from the point of view of economic and of strategic considerations, but he certainly would not commit himself to the view that these exports had not gained greater advantage than disadvantage. He denied that the power cuts had arisen as a result of exports of electrical generating equipment. In the main, this had consisted of small or medium-type generators, and the total capacity of the generators exported was very small in comparison to the production of a single power station in this country.

Answering a further question by Mr. Nabarro Sir Hartley Shawcross said that exports to the Soviet Union of electrical generating sets and generators (including parts) amounted in 1950 to £6,078,159 and to £389,685 in the current year up to 30th April. These exports to Russia had been for the most part small portable and medium size generating sets. Russian orders for portable sets, which constituted a large proportion of these exports in 1950, were completed before the end of the year. There had been adequate capacity to meet home demands for these types of equipment but the Government would naturally continue to watch the situation.

He understood that the vast majority of the small generators supplied to Russia were used in connection with the felling of timber. Last year one-fifth of our total imports of timber came from the Soviet Union.

Sir Arnold Gridley asked the President of the Board of Trade how many oil engine driven electrical generating units were exported from this country to the Soviet Union during the years 1949 and 1950; and what was the aggregate capacity in kilowatts or horse-power.

Sir Hartley Shawcross informed Sir Arnold Gridley that oil engine driven electrical generating units were not specified in the United Kingdom trade returns by number or capacity, but he was told that about 4,000 sets of a total capacity of some 225,000 kW were produced for export to the U.S.S.R. during 1949 and 1950. The majority of these sets were of 50 kW capacity.

Complete figures of the number and output

capacity of boilers and alternators for power stations exported to Russia during 1948, 1949 and 1950 were not available, but it was known that 52 alternators of various types, with a total rate of output of approximately 250,000 kW, in 1948 and 1949 and one 25,000 kW turbo-alternator set in 1950, were delivered under the wartime Civil Supplies Agreement. In addition twenty-four 500 kW steam driven generating sets with boilers and thirty 240 kW steam driven generating sets without boilers were delivered to Russia during 1949 and 1950. The total value of United Kingdom exports of electrical machinery to the Soviet Union during each of the years 1948, 1949 and 1950 was £2,186,000, £4,975,000 and £6,822,000 respectively.

Electric Fire Accidents

Mr. Rogers asked the President of the Board of Trade, if, in view of the large numbers of accidents resulting from the use of unprotected electric fires, he would introduce legislation to make compulsory the provision of safety guards on all such fires or radiators offered for sale to the public.

Sir Hartley Shawcross said that the introduction of legislation confined to the object suggested was not a matter for which he would be responsible, but he understood that an Inter-departmental Committee was at present considering the whole question of safety guards on electric fires and radiators.

Sulphur Allocations

Wing Commander Bullus asked the President of the Board of Trade how far the terms of the agreement whereby the United States of America was supplying this country with 95,000 tons of sulphur precluded the buying of any other available sulphur.

Mr. Bottomley said that no conditions were attached to the allocation of sulphur made to us by the United States Government for the second quarter of this year.

Price of Sulphuric Acid

Speaking on a motion by Sir Herbert Williams to annul the Sulphuric Acid (Prices) Order, 1951, Mr. Rhodes, Parliamentary Secretary to the Board of Trade, said that half of our total capacity for producing sulphuric acid was designed to operate on sulphur. It produced 1,100,000 tons of 100 per cent sulphuric acid a year; slightly more than one-half was for domestic consumption. Those who produced sulphuric acid from sulphur had little incentive to produce from pyrites or anhydrites on price considerations alone, because at a time when there was a sellers' market they preferred to continue to operate their plants on the old system at reduced capacity on higher realization as and when sulphur supplies improved, rather than incur heavy expenditure in providing new plant. The increased prices under the present Order benefited everybody. The profit allowed had no relation to the speed at which the turnover and conversion of plant was made.

Increased Power Production

Answering questions by Mr. Pickthorn, the Minister of Fuel and Power (Mr. Noel-Baker) said that plans had been made to expand the production of electric power as much and as rapidly as the available resources would allow. Consultations with the Economic Co-operation Administration were taking place, but even if it were possible for the Administration to give any help, the main burden of the programme must be met from our own resources. Last year 965 MW of new capacity was brought in and something between 1,050 MW and 1,100 MW would be added this year. The highest before the war was 755 MW.

New Consumers

Mr. Noel-Baker told Mr. Black that the difficulties to which the chairman of the London Electricity Board had recently drawn attention resulted from the rapid increase in the demand. In consequence, the distribution network now required to be considerably reinforced. Subject to the needs of rearmament and other essential work, everything possible would be done to enable the Electricity Boards to connect new consumers without undue delay.

Power Cuts

Miss Ward asked the Minister whether he was aware of the inconvenience caused to industry through the prolonged electricity cuts during the last few weeks and when the Northern Region might expect a regular supply.

Mr. Noel-Baker said that there were at present special difficulties in the supply of electricity in the North East, but he hoped that they might be reduced when new power stations came into operation in the Area and when additional supply lines were provided from the South. In the meantime he was considering what further measures could be taken to reduce the frequency and severity of power cuts.

Entry into Premises

Mr. H. Price asked the Attorney-General whether, in view of the recent legal decision that gas inspectors, under the Gas Act, 1948, had power to force an entry into private premises without a warrant, he would consider the introduction of legislation making it necessary for a warrant to be obtained.

Sir F. Soskice replied that powers such as those exercised by the gas inspector in this case had existed since the Gasworks Clauses Act, 1871. He was not aware that they had been oppressively or unfairly exercised and he did not think there was any ground for the change suggested.

Industrial Power Exhibition

Glasgow's Contribution to the Festival of Britain

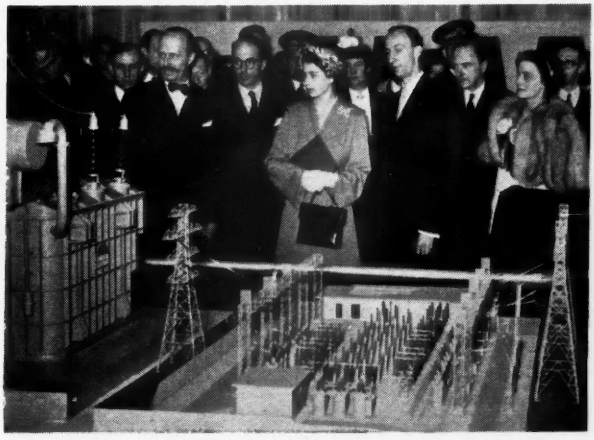
THE development and utilization of electricity is one of the main features of the Exhibition of Industrial Power which was opened by H.R.H. Princess Elizabeth at Kelvin Hall, Glasgow, last week as a part of the Festival of Britain celebrations. With man's conquest of power as the underlying theme, the exhibition traces the history of power back to the two main sources, coal and water, and is accordingly divided into two separate sequences which unite towards the end to lead to a glimpse into the Atomic Age in the Hall of the Future.

Reached from the entrance hall (" The Hall of Power ") past a model of the sun, the ultimate source of all power, the Coal Section takes the visitor in a historical progression from the primeval swamp to the modern mechanized mine, showing on the way the development of coal getting from primitive digging in outcrops of surface coal to the latest automatic cutting and stripping machines.

An actual pit cage, complete with electric winding gear (Beckett & Anderson) and warning bells, brings the visitor down the realistic representation of a mine, and contrasting with old-fashioned methods are such up-to-date appliances as the " Meco-Moore " coal cutter loader, Climax, Armstrong-Whitworth and Victor electrically operated drills, a " Samson " loader, various conveyors (Hugh Wood, British Jeffrey-Diamond, Richard Sutcliffe and Mavor & Coulson), trailer cables (C.M.A.), miners' alkaline cap lamps (" Ceag "), a watertight system (Simplex) and fluorescent lighting fittings (B.T.H. and John Davis & Son (Derby), the latter a pneumatic type with compressor).

In the Hall of Steel is a 25ft diameter spiral casing weighing 40 tons for a Francis turbine at the North of Scotland Hydro-Electric Board's Clachan generating station in which the English Electric Co., Ltd., Harland & Wolff, Ltd., and William Beardmore & Co., Ltd., have co-operated. Other items of electrical interest in this section are an endshield for an electric motor (John Harper & Co.), a " Nomag " electrical resistance grid (Ferranti), a ½in hand drill and stand (Black & Decker), an automatic arc welding machine (Metrovick) and a 5 ton electric overhead travelling crane (Herbert Morris).

The keynote of the Power for Industry Hall is the unremitting quest for fuel efficiency starting with James Watt and Richard Trevithick and continuing through the steam turbine to the latest types of economizers. With a model of a pulverized-fuel power station there is a series of illuminated coloured pictures representing modern generating station practice. There is also an actual Metrovick



Princess Elizabeth inspecting the model of English Electric equipment installed at the Loch Sloy hydro-electric station

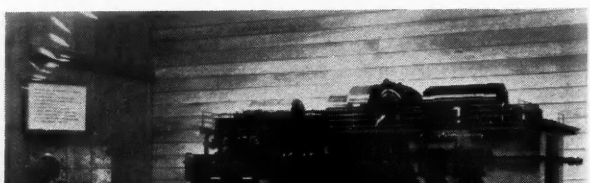
A view into the Hall of Electricity

turbine rotor, as well as a 2,270 b.h.p. high pressure, turbo-charged diesel engine (Mirrlees, Bickerton & Day) and an industrial gas turbine (Ruston & Hornsby) with its outer casing cut away to show the method of operation.

As an appropriate introduction to the Hall of Electricity stands the representation of a piece of amber against a background of a modern distribution network. Passing through various other early manifestations of electricity and magnetism the visitor is brought to a large portrait of Michael Faraday. Flanking this portrait are a scale model of a galvanized steel tower for a double circuit 275 kV overhead line and a series of pictures showing the various lighting and other devices evolved since Faraday's discovery.

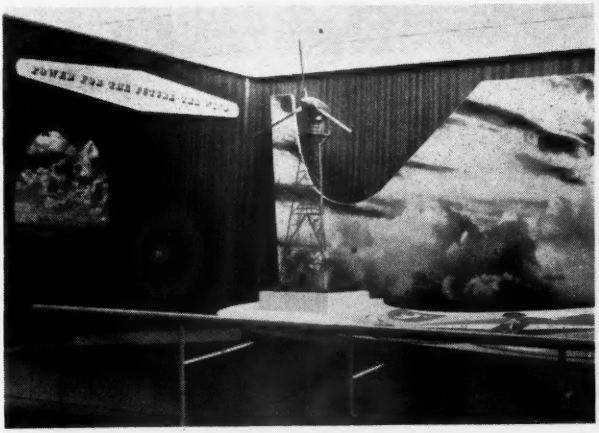
The central figure of the next section is Sir Charles Parsons and a model of his original ½ kW turbo-dynamo developed in 1884 is seen alongside a model of a Parsons 50 MW 1,500 r.p.m. turbo-alternator in Dalmarnock power station. From here the story passes to the vast output of the modern power station, showing the organization of the grid system and distribution. Typical items of equipment shown are a 66 kV 800 A outdoor oil circuit breaker (Ferguson, Pailin), a 2,000 kVA 33/11 kV transformer (Bruce Peebles), a 132 kV 2,500 MVA small-oil-volume circuit breaker and a glass bulb mercury arc rectifier (B.T.H.), a pumpless steel tank mercury arc rectifier (English Electric) and a display by the C.M.A. showing the development of power cables from 1878 to the present day.

Indicative of the wide applications of electricity are various examples of electric motors (Hoover, Metrovick and Bruce Peebles), a control cubicle containing starting gear for a 250 h.p. motor (Metrovick), an electric rivet heating and closing machine (Holden & Hunt), a radio frequency induction heater (Redifon), an industrial electronic metal detector (Cintel), a portable electric saw (Black & Decker), a hand drill (Wolf), a portable planer (S. N. Bridges & Co.), an electric screwdriver (Desoutter), a kettle (New Era Domestic Products), a cooker (" Creda



Models of the original Parsons ½ kW turbo-generator and a modern 50 MW 1,500 r.p.m. set

The wind-power exhibit



Comet "), a portable electro-medical short wave therapy unit (" Radyne "), a portable diagnostic X-ray unit (General Radiological), a radio set (Murphy) and a film projector (" Dekko "). At the exit from the hall are two large terminal bushings (Bushing Co. and Micanite & Insulators Co.).

The way in which the development of water power will stop the drift of population from the Highlands and restore prosperity is illustrated in the Hall of Hydro-Electricity. Adjacent to a model of the Loch Sloy power station is a series of displays showing what the coming of electricity means to the Highlander. A crofter's cottage before and after the installation of electricity is shown. Among the electrical items seen are a cooker (English Electric), cooker control unit (J. H. Tucker), alarm clock (Smiths), reflector fire (Elexcel), iron (" Systym "), kettle (Bulpitt), vacuum cleaner (Hoover), radio set (Ferranti), lighting fittings (Oswald Hollman, Primavera and " Henceforth "), milking machine (Fullwood & Bland), shearing machine (Wolseley), dehorner (Cooper Stewart), butter making machine (" Blanch Electrix "), cream separator (R. A. Lister), hammer mill with pneumatic delivery (Christy & Norris), root cutter (E. N. Bentall), saw bench (Armand Dutry & Co.), pistol drill (Wolf) and p.v.c. cable (C.M.A.).

Other displays show the raw materials at present unused in the North which could, with the aid of hydro-electricity, form the foundations of new and profitable industries. Finally come three possible sources of power: wind, as demonstrated by the experimental installation in the Orkneys; peat; and the tides, as projected in the Severn Barrage Scheme and applicable to the ragged western coastline of Scotland.

Applications of electricity to a modern water supply, irrigation, etc., are of special note in the Civil Engineering exhibit, while in the Hall of Shipbuilding and Railways are to be seen a layout of a ship's auto-controlled engine room designed and produced by Associated British Oil Engines, Ltd., and equipped throughout with Simplex bulkhead, floodlight and fluorescent lighting fittings. There are a number of Marconi instruments and the Redifon marine type radio transmitters and receivers. A model of the cable ship *Monarch* is also included in this section, as well as a Chloride emergency lighting system. Lighting fittings include a vertical adjustable reflector with a 360 deg rotation (Troughton & Young) and flush ceiling light fittings with glass prismatic lenses (Merchant Adventurers of London).

In the Railway Section are models of a 1,600 h.p. main line diesel-electric locomotive for the Egyptian State Railways (Vulcan Foundry and English Electric), a 3,000 h.p. main line electric locomotive and overhead transmission cables for Brazil (Vulcan Foundry, English Electric and B.I.C.C.) and a 2,800 h.p. gas turbine electric locomotive for British Railways. There is also a three-aspect searchlight with junction signal (Metrovick-G.R.S.).

On entering the Hall of the Future, the visitor walks in the present, looks down on the past and looks up to the future. In a series of pits below floor level the great pioneers of the past are seen at work: Watt, Trevithick, Faraday, Parsons and Rutherford. On the rails round a " lightning machine " producing million-volt flashes is a series of panels on which the process of releasing atomic energy is explained.

Cloth Shrinking

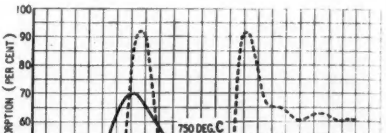
Automatic Infra-Red Machine

DURING the manufacture of woollen and other fabrics almost every process tends to stretch the component fibres and yarns. Yarns are sized, woven and finished under tension so that the cumulative stretch is "set" in the fabric and remains stable until the cloth is subjected to a more extreme combination of temperature and "regain." Shrinkage, which is the subsequent relaxing of this stretching, is a difficult problem as extensive use of the Hoffman steam press by the garment manufacturer may cause a woollen coat or dress to shrink 3in both in length and width. The only real solution is continuous and complete pre-shrinking of all materials, in piece form, before making them up into garments, with a degree of relaxation sufficient to prevent further contraction on the steam press.

A new machine designed by Mr. W. S. Emerson, B.Sc., for this purpose employs "Metrovick" infra-red projectors which consist of tubular elements of fine grade wire, enclosed in an outer sheath of non-corrodible alloy, fitted in special trough reflectors made of anodized aluminium sheet. The machine can put 5,000 yards of cloth through three processes in a working day of 8 hours.

At all stages, tension is avoided throughout the treated length by precision overfeed devices. The material can be treated in any trade width and is overfed at a calculated differential on to a steaming conveyor through a chamber which induces relaxation under uniform conditions.

The next stage is infra-red drying, to which the machine largely owes its high rate of operation. It removes the correct percentage of moisture in 4 to 5 seconds and restores the material to its normal "regain" content over the entire area of the piece; irregular shrinking is thus prevented. The total volume of shrinkage occurs while the material is passing through this chamber; the maximum amount of radiant heat is absorbed by the moisture in the fabric while the temperature at the fabric surface is low enough to avoid over-drying or imparting a harsh "handle" to the cloth.



Graph showing peak infra-red wavelength emission coinciding with one peak wavelength absorption of a film of water

The material emerging from the infra-red zone is cold set by high velocity air impact, which stabilizes it for delivery evenly and without tension by an automatic device at the end of the machine.

The material is now ready for making up and does not require any recuperative time whatsoever. Cloth of any type and shade can be processed in this way without marking or impairment of delicate finish or alteration of the shade.

Since the machine commenced operating it has processed some 1,000,000 yards of material. Every single processing factor can be varied, if desired. It has a single master control panel and variable speed gear for stepless changing from 7 to 27 yards per minute. An average length of 70 yards is generally arranged to pass completely through in 4–6 minutes. This rate of 10–14 pieces, or 700–1,000 yards, hourly is greater than anything that has hitherto been considered possible for this class of machine.

Throughout the process the operation is completely automatic. Hence the machine minder can devote more of his time to preparation of the next piece, measuring and inspecting.

Commerce and Industry

Ironmongers and Electrical Trading

Milk Cooling on the Farm

THE Electrical Section of the National Federation of Ironmongers in its annual report states that though the nationalization of electricity gives full legal right for the B.E.A. to carry on retail trading it is to be deprecated that the terms of this statutory authority are not being fully carried out in practice, as there is evidence that the price maintenance clause has not been observed and some Area Boards have been selling below list price. What is causing the greatest concern amongst members of the N.F.I. is the hire purchase system which Boards have considerably extended in many areas. It is alleged that terms are being offered against which no commercial concern, however large, could compete. On the question of the reduction of discount on certain types of commercial lighting fittings an endeavour was made to secure the co-operation of other electrical associations. The latter were extremely reluctant to discuss the issue since it was apparently considered that the retailer's interest was sufficiently represented on the Fair Trading Council by the National Electrical Contractors' Trading Association.

Traders and Nationalized Industries

Trading by Gas and Electricity Boards and the rating of their retail premises were among subjects discussed at last week's annual conference of the National Chamber of Trade at Hastings. A resolution was passed "viewing with alarm" the preferential rating treatment which appeared to be given to the Boards and calling for a full investigation. Another resolution asked the Chancellor of the Exchequer to order an immediate inquiry into the hire-purchase trading of the British Electricity Authority with a view to introducing a limiting factor similar to that operating in the case of private traders who had recourse to finance houses. It was further urged that the B.E.A. should not be permitted to compete unfairly with retailers and contractors in the sale of electrical apparatus and fittings and in installation work.

Large Magnetic Pulley

Rapid Magnetic Machines, Ltd., Birmingham, has recently completed manufacture of the world's largest diameter electro-magnetic pulley which is being shipped to the Belgian Congo. The equipment is to be installed as the terminal head pulley of a main conveyor system running at half mile centres and travelling at 256ft per minute, handling 700 to 800 tons of tin ore per hour. Weighing 12 tons, the pulley will extract "tramp iron" in the form of picks, shovels, cutter teeth and short lengths of mine railway line, from the ore before crushing; it is mounted on two main and two auxiliary roller bearing plummer blocks, the shaft being 16ft long by 8½in diameter. Containing over 3,000 lb of asbestos insulated copper wire, the magnet has a loading of 6·25 kW and is rated for continuous duty at 220 V.

Ground Sulphur Price Increase

The Ground Sulphur (Prices) Order, 1951 (S.I. 1951 No. 934, price 2d) which came into effect on 1st June, permits increases in the maximum prices of all grades of ground sulphur. These increases of approximately 30 per cent result mainly from the rise in freight rates since the start of the year.

Semi-Manufactures of Copper and Zinc

Since 1st April exports of semi-manufactures of copper and copper alloys have been restricted to approximately half the rate prevailing in the first six months of 1950. The Board of Trade now announces that, because of the continuing world shortage in the supply of the raw materials involved, and the high level of the demand for these semi-manufactures for essential purposes, these restrictions are to be extended in the same form for a further period of three months from the end of June. Another announcement will be made before the end of September. The export of semi-manufactures of zinc will continue to be permitted only in exceptional circumstances. Applications for export licences should be addressed, fully documented, to the Export Licensing Branch of the Board of Trade, Regis House, King William Street, London, E.C.4. The validity of existing licences is not affected by this notice.

Douglas Sick Pay Arbitration

Douglas (I.O.M.) Town Council has decided that a dispute regarding sick pay arrangements of workers in the Electricity Department should be referred to arbitration. Last December the Transport and General Workers' Union and the Electrical Trades Union gave notice that a revision of the existing wage agreement would be sought to introduce the sick pay

scheme in accordance with the national agreement in England, providing for 13 weeks' full pay, less Social Services sick benefit. Douglas Corporation Electricity Committee and the I.O.M. Electricity Board recommended that a scheme should be offered under which employers and employees would each contribute 6d a week from which a benefit of £2 a week for 52 weeks would be paid. This was not acceptable to the unions which asked for a non-contributory scheme but were prepared to consider one in which the employers made a 75 per cent and employees a 25 per cent contribution.

Crompton Parkinson "Open" Day

On 26th May the Chelmsford works of Crompton Parkinson, Ltd., were "open" for employees to bring along their families and friends to see how electrical machines, switchgear, instruments and meters are manufactured in the factories. More than 3,000 persons took the opportunity of exploring the works. Visitors were invited for either a morning or afternoon conducted tour lasting about three hours, covering the whole of the works and including representative manufacturing operations carried out by women and men employees who volunteered to work for the occasion. Every visitor received a souvenir programme giving a brief account of the company's history. An exhibition had been arranged to give an overall picture of the C.P. organization with its nine British works, its associations with other companies, and its extensive manufacturing and commercial interests overseas. There were displays of some of the other products made by different works in the group—lamps and lighting fittings, motor vehicle batteries, a.c. motors, Nelson stud welding equipment, together with photographs of the large transformers and switchgear not made at Chelmsford. The tour covered the machine, meter and instrument and switchgear departments and the high power testing station. Refreshments were served at improvised cafeterias in the different departments.

Batti-Wallahs' Society

More than usual interest was aroused at last week's luncheon of the Batti-Wallahs' Society by the admirable address given by the Earl of Verulam on "Wind Power." After introductory remarks on the history of wind-driven machinery, the Earl of Verulam, with the aid of lantern slides, described some of the developments in wind-driven generators, and concluded with a description of the 100 kW wind generator which his company (Enfield Cables, Ltd.), is developing for the British Electricity Authority, to be installed in North Wales.

Mr. W. E. Warrilow, who proposed a vote of thanks to the speaker, referred to some of the early efforts to develop wind-generators, in which he took an active part, and said he was glad that interest in this method of generation was being revived.

Non-Ferrous Scrap Prices

Because of the recent increases in the price of copper and nickel, the Minister of Supply has made the Non-Ferrous Metals Prices (No. 5) Order (S.I. 1951 No. 980), increasing the maximum prices of non-ferrous scrap. The Order also provides that builders' merchants may be paid a commission of 1½ per cent on re-melted lead, and fixes a new price of £115 per ton for old zinc free from tar.

Link with Australia

The accompanying illustration is of a stand arranged by the British General Electric Co., Ltd., at the Royal Agricultural Society Show held in Sydney, N.S.W., in April. The theme of the display was the link between the Australian company and its parent concern the General Electric Co., Ltd., of England, in the provision of "Everything Electrical." There was a model of the Australian company's works and a selection of industrial and domestic appliances and equipment.

The B.G.E.C. stand at a recent Sydney exhibition

New Cored Solder Factory

On 4th June the Government-sponsored Hemel Hempstead New Town Corporation began the building of a new factory for Multicore Solders, Ltd. Due to be completed before the end of the year, the factory will be the second to be opened in the new town and will be the largest in the world constructed solely for the manufacture of cored solder. Mr. R. Arbib (managing director) states that the factory will enable them to more than double their output.

Works Holidays

The Newport (Mon) cable works of Standard Telephones & Cables, Ltd., will be closed for the annual holiday from 30th July until 14th August.

The Telcon Works, Greenwich, and the Frequency Works, Farnborough, Kent, of the Telegraph Construction & Maintenance Co., Ltd., will close for the annual holiday from 20th July to 7th August.

Milk Cooling in the Churn

A different method of milk cooling from those described in our recent articles on modern farming practices in the Newbury Sub-Area of the Southern Electricity Board (*Electrical Review*, 16th and 23rd February) is to be seen in another farm in the same area. At Manor Farm, Great Shefford, where Lord Lyle has a herd of thirty Jersey cows, the milk is taken straight from the cows and put into churns, which are then placed direct into a "Prestcold" churn immersion chilled water cooler, where the milk is cooled to below 50 deg F in one hour or less.

Operated by means of a small refrigeration unit with a ½ h.p. motor, this cooler accommodates four churns which remain immersed in the chilled water until the time comes for despatch. The 80 gallons of water used in the cooler is maintained at a temperature of approximately 33 deg F. Incidentally it is pointed out that our photograph was not taken during a milking period, when the operator would be wearing a white smock and head covering.

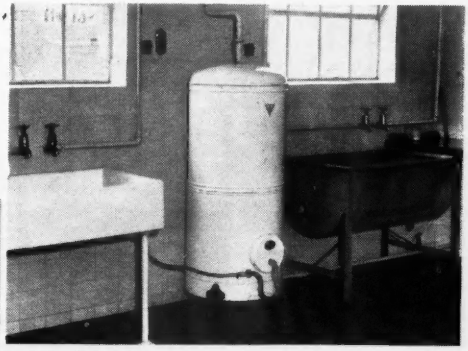
In the dairy also are installed a Lister cream separator, a Rowlway butter churn, and a J. W. Woolley & Co.'s "Clifton" 35 gall water heater for washing purposes. A 48 cu ft sterilizer is supplied with steam by an 18 kW electrode boiler (both of Perkins manufacture) situated in an adjoining room. An "Aero-vap" unit is found of great service in keeping the milking shed free from flies.

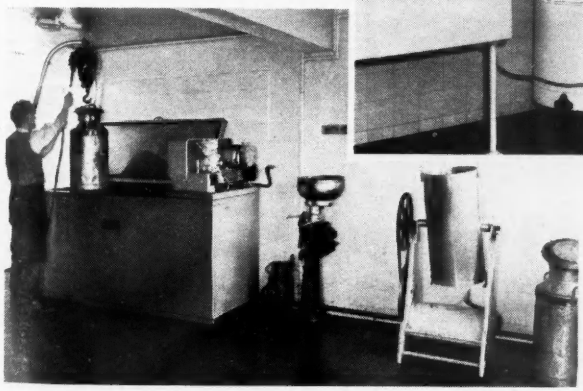
Change of Address

The Mid-Sussex Sub-Area headquarters of the South Eastern Electricity Board are now at Mid-Sussex House, North Road, Brighton, 1 (telephone: Brighton 25961). The head office of the Brighton and Hove District remains at Electric House, Castle Square, Brighton, 1.

Hoover Activities

From 14th to 21st June, Hoover, Ltd., are to hold an international conference, with headquarters at the Savoy Hotel, London. The guests will include directors of associated companies overseas, distributors, agents and their wives from the majority of the 66 countries to which the company's products are exported.





Above: **35 gall water heater for washing up purposes**

Left: **Churn immersion milk cooler, cream separator and butter churn at Lord Lyle's farm**

Apart from both formal and informal meetings at the conference, there will be visits to two of the company's factories—the washing machine factory at Merthyr Tydfil, Wales, on 15th June and to the parent factory at Perivale, on 18th June. In addition to a South Bank Exhibition tour, there will be river trips and a visit to Stratford-on-Avon on 16th June.

Official approval has been given to Hoover, Ltd., for an extension to its High Wycombe factory, where plastic moulded commutators for electric motors, "Dustette" cleaners, switches and spare parts for cleaners, are made. Sixty per cent of the factory's production is exported to the United States and Canada.

The extension will add 60 per cent to the area of the existing factory. Plans have been made for the building and occupation of the additional accommodation in sections, so that scheduled production can be maintained. Approximately half the additional space will be occupied within the next month and all the new work completed by December.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton	£124 0s 0d
COPPER, H.C. Electro	ton	£234 0s 0d
Fire Refined 99·7 per cent	ton	£233 0s 0d
Fire Refined 99·2 per cent	ton	£232 10s 0d
LEAD, English	ton	£161 0s 0d
MERCURY	flask	£73 10s 0d
TIN	ton	£1,070 0s 0d
ZINC, G.O.B. Foreign	ton	£160 0s 0d
Electrolytic	ton	£164 0s 0d
BRASS Tubes	lb	2s 0½d
Sheet	lb	2s 3½d
Wire	lb	2s 6d
COPPER Tubes	lb	2s 2⅞d
Sheet	ton	£284 10s 0d
H.C. wire and strip	ton	£261 15s 0d
PHOSPHOR BRONZE Wire	lb	3s 8d
RUBBER, No. 1 R.S.S. spot	lb	43½d–44d

Trade Announcements

Philips Electrical, Ltd., announces that a new depot for Philips Light Group products, under the management of Mr. R. Winsby, has been opened in Belfast at 28a, Alfred Street (telephone : Belfast 20619). Other Philips products, especially Philips radio and television, "Philishave" dry shavers and "Photoflux" flashbulbs, will continue to be distributed solely by Eirco (Wholesale), Ltd., 29, Wellington Place, 28-30, College Street, Belfast.

From 11th June the executive offices of **Blaw Knox, Ltd.**, will be at 90-94, Brompton Road, London, S.W.3 (telephone : Kensington 5151, telegraphic address : Blawnox Southkens London).

Mr. L. Walker has been appointed representative for **Metway Electrical Industries, Ltd.**, in Northern Ireland and Eire.

Bill Switchgear, Ltd., has acquired office and stores accommodation in Church Street, Bedminster, Bristol, and these are in the charge of the company's area manager, Mr. W. L. White.

British Electrical Repairs, Ltd., inform us that in their advertisement on page 54 of our issue of 18th May the names of their district managers at Newcastle and Hawick should have been given as J. Jemison and H. C. M. Jolliffe respectively.

A.C.E.C. (Ateliers de Constructions Electriques de Charleroi) have appointed Land Speight & Co., Ltd., 73, Robertson Street, Glasgow, C.2, as exclusive distributors in Scotland for "Dictorel" dictating machines.

Catalogues and Lists

Kelvin & Hughes (Industrial), Ltd., 2, Caxton Street, London, S.W.1.—Technical brochure on high speed pen recorders and another describing a supersonic flaw detector.

English Electric Co., Ltd., Queen's House, Kingsway, London, W.C.2.—Two illustrated brochures—one on industrial combination fuse-switchboards and the other on distribution equipment for the textile industry.

Plessey Co., Ltd. (Components Division), Ilford, Essex.—Technical brochure on vibrators.

Richard Sutcliffe, Ltd., Universal Works, Horbury, Wakefield, Yorks.—Five illustrated brochures on industrial conveying equipment.

Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, London, E.C.1.—Priced and illustrated folder on domestic appliances.

British Oxygen Co., Ltd., Bridgewater House, Cleveland Row, London, S.W.1.—Technical brochure describing "Argonarc" welding equipment.

Chilton Electric Products, Ltd., Hungerford, Berks.—Catalogue of "Atlas" miniature circuit breakers and earth leakage circuit breakers.

B. & H. (Nottm.), Ltd., Popham Street, Nottingham.—Priced catalogue of "Bermex" switch and fuse gear and miscellaneous wiring accessories.

English Electric Co., Ltd., Switchgear Department, Stafford.—Technical folder on air blast circuit breakers.

Hanovia, Ltd., Slough, Bucks.—Profusely illustrated 24-page booklet outlining the company's activities in the manufacture of ultra-violet and infra-red ray equipments during the past 25 years.

Britannia Batteries, Ltd., 66, Victoria Street, London, S.W.1.—Leaflet describing the heavy duty "Alklum" handlamp.

Industrial Safety

Modern Methods Demonstrated at Birmingham

MANY electrical manufacturers were among the 150 firms who co-operated last week in a four-day Industrial Safety Exhibition held by the Birmingham and District Industrial Safety Group at Bingley Hall, Birmingham. It was officially opened by the Lord Mayor of Birmingham, Alderman R. C. Yates, J.P., and admission was free.

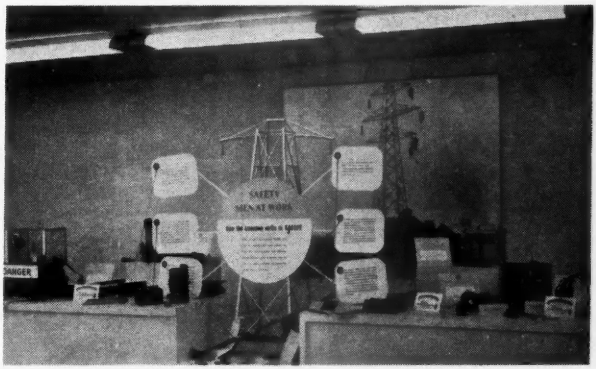
At a luncheon following the opening Mr. A. B. Waring, joint managing director of Joseph Lucas, Ltd., pointed out that whereas mechanical failures could be guarded against by the maintenance men, human failings, which accounted for a far larger proportion of accidents, could only be avoided by education. In his own factory it had been possible to halve the number of accidents.

Mr. R. Bramley-Harker, Superintending Inspector of Factories, said that of the 193,000 accidents recorded in 1949, 30,000 were due to machinery, 18,000 to hand tools, a similar number to articles dropping on people, 25,000 to people falling and 54,000 on handling of products. It was high time that industry recognized the status of the factory safety officer. After suggesting typical ways in which accidents could be avoided, such as insisting on the use of eye shields, Mr. Bramley-Harker emphasized that frequently the greatest sufferer was not the victim himself but his dependants. Industry was short enough of man power and could ill afford the loss of effort.

Prominent among a comprehensive display arranged by members of the Industrial Safety Group was a section for which the British Electricity Authority and the Midlands Electricity Board were responsible. A centrepiece devoted to the Authority's safety rules for work on electrical and mechanical equipment was accompanied by live line detectors, typical colour symbols, test equipment for locating electrical faults, magnetic crack detection apparatus for pressure vessels, gas detection and rubber glove testing equipment.

The importance of employment of qualified electricians, as well as the need for proper maintenance, was emphasized by various examples of correct and incorrect wiring. Advantages of the new consumers' service boards were indicated. Earth leakage and overload protection apparatus and electrical and mechanical interlocks were also shown, together with typical electrical appliances demonstrating good practice for industrial purposes. Especial attention was drawn to the desirability of employing 110 V for portable tools and 25 V for inspection handlamps with centre tappings on the transformers giving maximum pressures to earth of 65 V and 12·5 V respectively.

Methods of padlocking electrical control gear, various types of machine guards and a simple device for indicating at a remote point whether machinery is in motion were



Display by the B.E.A. and Midlands Electricity Board at the Industrial Safety Exhibition

items displayed by I.C.I., Ltd., and Alkaline Batteries, Ltd., demonstrated a safety device for an electromagnetic chuck. The Witton-Kramer photo-electric press guard attracted considerable attention in the G.E.C. display, which also covered the testing of portable plant, low-voltage apparatus, supersonic flaw detectors and the correct guarding of guillotines. A display panel indicated correct and incorrect methods of wiring and photographs illustrated mechanical handling methods, the use of portable exhaust fans for swarf, and the effects of repainting factories to secure improved illumination.

Further examples of ways of securing safety in industry and in the home were demonstrated in a separate G.E.C. exhibit, special attention being directed to the use of flameproof equipment, a patent method of travelling crane control and to safety features of the company's domestic appliances.

Butcher-Black & Decker earth protection units and "Terra Tertia" apparatus for testing earth continuity in trailing cables, etc., were demonstrated by Electro Methods, Ltd., and George Ellison, Ltd., drew attention to special safety features in their circuit breakers and motor starters, with particular emphasis on correct methods of connection. The associated company, Tufnol, Ltd., indicated some of the attributes of "Tufnol" non-metallic material: its lightness (half the weight of aluminium), elimination of noise, good mechanical strength, electrical insulation, and resistance to chemical action.

Safety and welfare films and an essay competition for scholars and young workers, were other features of the exhibition which was well attended throughout.

Canadian Electrical Exports

EXPORTS of electrical goods and apparatus from Canada last year were valued at $11,089,000, a decrease of almost 20 per cent on 1949. The decline extended over most lines of trade, notable exceptions being telegraph and telephone apparatus and radio goods, other than receiving sets. In generators, motors and transformers the falling-off was particularly marked. Totals of the groups and some noteworthy destinations, with notes of increases or decreases compared with 1949 are shown in the accompanying table.

Class of Goods	1950 $ (000)	Inc. or dec. compared with 1949 $ (000)
Batteries, storage and parts	449	— 414
Batteries not otherwise specified and parts	316	— 126
To British Malaya	233	+ 38
„ *Indonesia*	52	— 168
Radio receiving sets	1,256	— 171
To Philippines	2	— 148
„ *Venezuela*	340	— 62
„ *U.S.A.*	265	+ 245
Radio apparatus, other	2,133	+ 594
To United Kingdom	8	— 126
„ *Brazil*	190	+ 148
„ *China*	4	— 92
„ *Italy*	207	+ 176
„ *Sweden*	119	— 114
„ *U.S.A.*	1,345	+ 972
Dynamos, generators and parts	398	— 532
To Australia	1	— 15
„ *Brazil*	287	— 339
„ *Cuba*	35	+ 6
„ *Indonesia*	26	+ 15
Motors and parts	1,504	— 400
Transformers and parts	385	— 591
To Venezuela	2	— 15
„ *Brazil*	119	— 589
„ *Mexico*	6	— 106
„ *Norway*	62	+ 58
„ *Bermuda*	2	— 15
„ *South Africa*	164	+ 160
Meters and parts	1,941	— 428
To Brazil	334	+ 5
„ *Chile*	192	— 94
„ *Colombia*	147	+ 13
„ *Cuba*	217	— 89
„ *Mexico*	606	— 113
„ *Venezuela*	141	— 23
Electric cooking stoves	141	— 197
To South Africa	12	— 73
„ *Ireland*	48	— 128
Telegraph and telephone apparatus	549	+ 455
To Bermuda	3	— 8
„ *Brazil*	38	+ 16
„ *Cuba*	11	— 3
„ *U.S.A.*	440	+ 433
Spark plugs, magnetos, etc.	853	+ 309
To India	140	+ 103
„ *South Africa*	229	+ 40
„ *New Zealand*	6	— 31
„ *Australia*	12	— 14
„ *S. Rhodesia*	16	— 6
„ *Norway*	34	+ 34
„ *Mexico*	171	+ 108
„ *Switzerland*	45	+ 26
Electrical apparatus, n.o.p.	1,078	+ 236
„ *Norway*	137	+ 112
„ *Brazil*	135	— 17
„ *Belgium*	101	+ 89
„ *U.S.A.*	243	+ 125

ELECTRICITY SUPPLY

Month's B.E.A. Contracts Exceed £5 Million
Solving Queensland Shortage

DURING the past month the British Electricity Authority has placed contracts for equipment (including several bulk orders for transformers) amounting in the aggregate to to £5,231,547. The principal contracts include the following:—

Bold power station, St. Helens, Lancs: Steel frame for turbine house and boiler house buildings.—Dorman Long & Co., Ltd. Ince station, Ches.: Site clearance and preliminary works.—A. Monk & Co., Ltd. Huddersfield station: Coal-handling plant.—Richard Sutcliffe, Ltd. Chadderton station, Oldham: Two turbo-alternator blocks.—M. J. Gleeson (Contractors), Ltd. Roosecote station, Barrow: Two brick chimneys.—P. C. Richardson & Co. (Middlesbrough). Elstree substation: 132 kV 3,500 MVA switchgear.—A. Reyrolle & Co., Ltd. Brighton-Three Bridges and Brighton-Worthing: 132 kV overhead lines.—Watshams, Ltd. Tilbury-Elstree: 275 kV double-circuit overhead line.—J. L. Eve Construction Co., Ltd. Bustleholme-Drakelow, Burton-on-Trent: 132 kV overhead line.—Balfour, Beatty & Co., Ltd. Rodley substation, Yorks: 60 MVA 132 33 kV transformers and earthing transformers.—English Electric Co., Ltd. Currie substation, Midlothian: 132 kV 2,500 MVA switchgear.—British Thomson-Houston Co., Ltd.

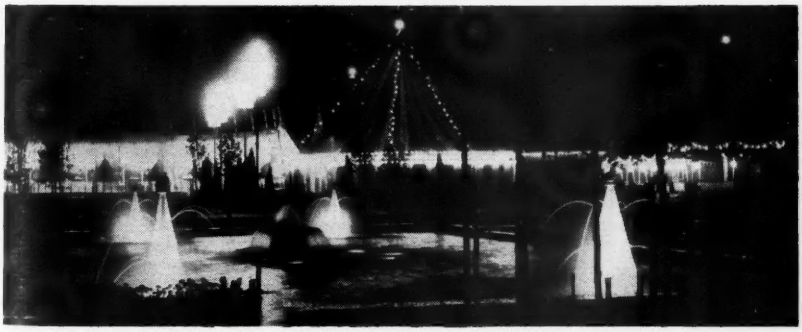
The bulk orders for 132 33 kV transformers and earthing transformers were as follows:—60 MVA: Ferranti, Ltd., 14; Metropolitan-Vickers Electrical Co., 8; British Electric Transformer Co., 6; English Electric Co., 6; British Thomson-Houston Co., 2; 45 MVA: Hackbridge & Hewittic Electric Co., 10; Fuller Electrical & Mfg. Co., 8; C. A. Parsons & Co., 8; General Electric Co., 2; Bruce Peebles & Co., 2; 30 MVA: Johnson & Phillips, 4.

Lakeland Scheme Withdrawn

For some time past a proposal for the erection of an overhead power line from Coniston to Grasmere, with a spur to the Langdale valley, has met with opposition from Lakeland planning authorities. Except for certain parts of the route it was insisted that underground cables should be used. Because of present restrictions on capital expenditure the North Western Electricity Board has now withdrawn its application to the Westmorland County Council for planning consent.

"Packaged" Power Plant

In an endeavour to avert electricity rationing in S.E. Queensland, the City Electric Light Co., Ltd. (Brisbane) has placed an order in the United States for a 10,000 kW "packaged" power station for operation on the Ipswich coalfield before the winter of next year. This



Illuminations at the recently opened Festival Pleasure Gardens at Battersea Park

is announced in the company's annual report which says it is now clear that generation from Bulimfa " B," planned to start last February, cannot commence before 1953 at the earliest. Because of the increasing shortages of materials the directors recently established a subsidiary to produce coal, timber, building materials and other essential goods. During the year the City Electric Light Co., in accordance with its franchise agreement, began trading in electrical apparatus, this new enterprise proving an immediate success.

Water Power Replaces Diesel Stations

Householders in the Gairloch, Aultbea and Poolewe district of Ross-shire and the Strathglass district of Inverness-shire are to pay less for their electricity which is now produced by water power instead of diesel plant. The former district is now supplied from the hydro-electric station at Gairloch, and the latter from the Highland grid through a substation at Beauly.

Scottish Power Improvements

In view of the increasing demand for electricity in the centre of Glasgow, the South West Scotland Electricity Board has approved a scheme to reinforce the network at a cost of £34,000. The Board has also decided to spend £84,000 on providing a supply to new housing schemes at Newlands.

East Midlands Area

We have received from the East Midlands Electricity Board a folding map, mounted on linen, which clearly shows the Sub-Area and District divisions of the Area. The scale is four miles to the inch. A pocket in the cover contains the Area handbook giving details of personnel.

Quebec Hydro-Electric Scheme

The Aluminum Company of Canada, Ltd., has announced that work is to start immediately upon the construction of a second 200,000 h.p. generating station on the Peribonka River, the principal waterway of the Lake St. John watershed. The company is already building a power house at Chute du Diable; the new site is known as Chute Savanne. Plans call for the entire job to be finished within a two-year period.

Welsh Rural Needs

How electricity could benefit rural Wales was discussed at a recent meeting of the Executive Committee of the Denbighshire Rural Community Council. One suggestion was that Welsh public authorities should meet to consider a " T.V.A. scheme " to develop Welsh water resources. Concern was felt that any such development should benefit the local people. Sir William Jones (Ruthin) observed that after seeing the Scottish schemes he was not so afraid of the effects on the amenities and Alderman Edward Williams (chairman, Denbighshire County Council), while agreeing that development was possible without creating an eyesore, said he was more concerned with bringing modern improvements to the homes of the people. Mr. Gwilym R. Jones spoke of the larger issue of developing small industries in the Welsh hinterland.

Street Lighting

DAGENHAM Borough Council Highways and Works Committee, subject to consent, proposes to enter into a contract with the Eastern Electricity Board for the third stage of the major roads lighting conversion scheme (£10,380) and for the supply of mains services (£3,154).

MANCHESTER City Highways Committee proposes to spend a further £19,000 on converting street lamps on main roads from gas to electricity and £9,900 on the installation of new street lighting at Wythenshawe.

Effect of Capital Expenditure Cuts

In a letter from the chairman of the Southern Electricity Board (Mr. H. Nimmo) submitted at a meeting of the Area Consultative Council at Southampton it was stated that because of restrictions on capital expenditure it was most unlikely that the Board would be able to meet more than a fraction of the requests for new supplies during the current financial year. The Central Authority proposed to apportion the total amount of capital available among the Boards as equitably as possible and at the same time give the Government a clear statement of the effect which the restrictions would have on supplies to housing estates, new towns and important industrial concerns.

Rural Extensions

The position of the consumer who, having paid a capital contribution towards the costs of an extension, asked for a rebate in respect of additional consumers subsequently connected was discussed by the Southern Electricity Consultative Council at the same meeting. A letter from the Board said that it was accepting a certain risk if it asked subsequent consumers for more than the actual cost of connecting their own premises. It had been the practice of undertakings generally to charge the second consumer on that basis, and they were therefore not in a position to make a refund to the first consumer. The Board endeavoured to avoid such situations arising, by extensive canvassing of all potential consumers whenever an extension was planned, with the object of reducing or eliminating the contribution by incorporating other consumers, to bring the gross revenue up to 15 per cent.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Siemens Bros. & Co., Ltd.—Continued progress is reported by General Sir Hubert Gough (chairman), in his statement circulated with the report and accounts. He says that their efforts over the post-war years to re-establish and expand their manufacture of telecommunications apparatus are now showing results. Towards the end of the year a shortage of manufacturing materials began to be evident, and this will particularly affect the electric cable industry. Telecommunication equipment in relation to its cost absorbs less material and it is hoped there will not be much hindrance to output. A notable contract for their motor uniselector was placed during the year by the British Post Office for its initial automatic trunk exchange. Progress was maintained in the development and production of telephone transmission equipment of various types. The company supplied telephone amplifier repeaters for underwater use to the British Post Office for inclusion in the Anglo-Dutch submarine cables, and voice-frequency telegraph terminal equipment for the coaxial submarine cable between this country and Denmark. A noteworthy development on the telephone cable side was an advanced type of air-spaced coaxial cable for embodiment in trunk-type cables.

The past year started badly for power cables, but by the autumn the situation had improved. Substantial orders for such cable have been received from the B.E.A. and Electricity Boards. Orders for rubber and other cables though also poor in the early part of the year, increased later. Overseas orders in 1950 improved as compared with the previous year and their overseas companies in Australia, Canada, India and South Africa have been very active. Siemens Electric Lamps & Supplies, Ltd., has had a satisfactory year, and improved machinery for lamp production was put into operation. Their "Silvalux" lamp has been re-introduced and new types of street lighting fittings using fluorescent tubes have been evolved. Submarine Cables, Ltd., jointly owned by them and the Telegraph Construction & Maintenance Co., Ltd., has had a successful year and the Siemens & General Electric Railway Signal Co., Ltd., owned jointly by themselves and the G.E.C. continues to make good progress.

Sir Hubert Gough expresses anxiety at the decision of the Board of Trade to direct the Custodian of Enemy Property to dispose of a large block of stock in an important electrical manufacturing company, and to invite inquiries from interested parties. The holding in question comprises £450,000 of Siemens' ordinary stock issued by arrangement to Siemens & Halske, Berlin, in 1929 in return for an equivalent value of their shares. By circumstances beyond their control, it was not possible for them to provide for the purchase of these shares in 1949 by persons nominated by them as intended. The Siemens & Halske shares held by them are, owing to the effects of war, at present of uncertain value. Nevertheless, the board has felt that stockholders, who have borne the provision of reserves against the uncertain value of the holding in Siemens & Halske, should be the preferred parties so far as the acquisition of the expropriated stock is concerned. An offer has already been made with a view to making the stock available to stockholders, and the company is arranging for a further offer to be made before the closing date for offers expires.

The Calcutta Electric Supply Corporation, Ltd.—In his circulated statement Sir James Donald (chairman) says that electricity consumption during 1950 increased by 35,462,318 kWh, bringing the sales up to 763,894,679 kWh. This increase was shared by all classes of consumers, with the marked exception of jute mills whose working was restricted by their inability to obtain adequate supplies of jute from Eastern Pakistan. With the approaching completion of New Cossipore and the extensions to Mulajore, the capital expenditure on their post-war generating plant programme will shortly come to an end. These additions to their generating capacity will enable them to meet the estimated loads for some years to come. Having regard to the long period now required to complete any new generating station, it is necessary to take a long view in planning for the provision of the new station which will sooner or later have to be built. A site for this station has been secured adjoining their Southern Station and plans and specifications have been prepared so that action can be taken at the appropriate time. They estimated that the distribution side, the provision of further accommodation for the meter testing and repairing department, and normal expansion of the system during the next five years would require something like

£6½ million. It was hoped to meet this by increased bank accommodation, increased allocations for depreciation and relief from taxation arising from initial allowances.

The Ever Ready Co. (Great Britain), Ltd., held its annual meeting on 31st May. In his statement Mr. E. N. Rowbotham (chairman) said that the sales and net profit for the year under review constituted a record. The result was due to the spread of the company's activities and in particular to the rapid development of its export trade through its wholly owned subsidiary, the Berec Battery Export Co., Ltd. Dealing with their business, apart from the main business of dry batteries, the chairman said that the sales of radio receivers using their all-dry radio batteries had increased, and a considerable success had been achieved by the "Saucepan Special," a short wave receiver specially designed for use in Central Africa. Sales of miniature electric motors and toys using dry batteries which were introduced last year had progressed satisfactorily.

Worthington-Simpson, Ltd., report a trading profit for 1950 of £556,160, as compared with £432,002 for 1949 and after providing for depreciation, etc., and £294,375 for taxation, there is a net balance of £201,375 (against £152,644), to which is added £116,172 brought in and £1,287 provisions no longer required. A sum of £15,000 is set aside for supplementary retirement benefits, £100,047 is placed to general reserve and it is proposed to pay a final ordinary dividend of 10 per cent, making 20 per cent, less tax, for the year (same). During the year the issued ordinary capital was increased by £160,000 from reserves and bonus shares were allotted to ordinary shareholders in the proportion of one for every two shares held.

In his statement Sir Samuel R. Beale (chairman) says that the order book is satisfactory. They increased their production last year, and while further efforts are being made to increase it this year, for the immediate future there are limitations imposed principally by shortages of labour and materials. For the long term, however, plans are envisaged which will bring their manufacturing capacity more into line with the demands which are now being made upon it both from home and overseas.

The Ship Carbon Co. of Gt. Britain, Ltd. (a subsidiary of the Morgan Crucible Co., Ltd.), reports that, after tax of £111,335 (£92,700), the net profit for 1950 was £96,506 (£96,859). The ordinary dividend is raised from 15 to 25 per cent.

The Southern Areas Electric Corporation, Ltd., in a preliminary statement, shows a net profit of the parent company of £23,477 for 1950, as compared with £32,585 for 1949. After deducting losses in certain subsidiaries, and meeting other charges the group net loss is £5,995 (against a profit of £19,456). No dividend is proposed for 1950 (against 5½ per cent for 1949).

Yarrow & Co., Ltd., propose to double the present £150,000 of capital by a one-for-one scrip bonus.

Ozonair, Ltd., reports a trading profit for 1950 of £10,428 (against £9,825). The ordinary dividend is 8½ per cent and £3.2s.6 (£3,408) is carried forward.

Lightfoot Refrigeration, Ltd., reports a net profit for 1950 of £28,601, as compared with £45,399 for 1949. The final dividend of 5 per cent (same) again makes 8 per cent for the year.

Holophane, Ltd., has declared an interim dividend of 7½ per cent (unchanged).

The General Cable Manufacturing Co., Ltd., is maintaining its interim dividend at 12 per cent.

R. A. Lister & Co., Ltd., are paying an interim dividend of 2½ per cent (same).

The Plessey Co., Ltd., has declared an interim dividend of 10 per cent (unchanged).

New Companies

I. H. Electrical Service, Ltd.—Registered 2nd April. Capital £2,000. Radio and television engineers, etc. Directors: L. A. Desmond, Mrs. Peggy M. Desmond and A. W. Stoner, Ivy Cottage, Beechenlea Lane, Swanley, Kent. Secretary: Margaret E. D. Brightwell. Regd. office: 2, Corona Buildings, Swanley, Kent.

I. H. Electrical Co., Ltd.—Registered 2nd April. Capital £5,000. To acquire the business of a radio and television retailer carried on by Leslie A. Desmond as "Ideal Home Electrical Company" at 2 & 4, Corona Buildings, Swanley, Kent. Directors: L. A. Desmond and Mrs. Peggy M. Desmond. Other details as above.

H. L. Service, Ltd.—Registered 11th April. Capital £100. Wireless, television and electrical engineers and contractors, servicers, repairers and installers of radio, television, electrical and mechanical apparatus, etc. Directors: W. E. Hobbs and Elsie D. Lines. Regd. office: 26, Freshfields Avenue, Upminster, Essex.

C. F. Lake, Ltd.—Registered 12th April. Capital £1,000. Electrical and electronic engineers and contractors, etc. Directors: C. F. Lake and Mary H. Lake. Regd. office: 37, Stoke Road, Slough, Bucks.

Edelman (Electrical Contractors), Ltd.—Registered in Edinburgh 22nd May. Capital £1,000. Electricians, electrical engineers, etc. Subscribers: Bette Waddell, 125, Dunera

Street, Tollcross, Glasgow and Frances Gallagher, 1, Strathord Street, Sandyhills, Glasgow.

Battery Electrics (Herefordshire), Ltd.—Registered 19th May. Capital £7,000. To acquire the business of a motor factor carried on by G. C. Warburton as "Battery Electrics" at Leominster, Herefordshire. Directors: G. C. Warburton (permanent managing director) and Mrs. Elsa J. Chapman. Secretary: G. C. Warburton. Regd. office: 21, Etnam Street, Leominster.

Wallington Electric, Ltd.—Registered 26th April. Capital £1,500. Manufacturers of and dealers in electrical and other equipment and appliances, etc. Directors: S. G. Burdick, Avice M. Burdick, Geraldine C. M. Prendergast and L. F. Barter. Regd. office: 169, Stafford Road, Wallington, Surrey.

Increases of Capital

Collins Electrical, Ltd.—Increased by £7,000, in 5,000 "A" shares of 2s each and 6,500 "B" shares of £1 each, beyond the registered capital of £7,000.

Telegraph Condenser Co., Ltd.—Increased by £300,000, in 600,000 ordinary shares of 10s, beyond the registered capital of £280,000.

Watford Electric & Manufacturing Co., Ltd.—Increased by £90,000, in 90,000 6 per cent cumulative preference shares of 10s and 450,000 ordinary shares of 2s each, beyond the registered capital of £160,000.

Insulators, Ltd.—Increased by £100,000, in £1 ordinary shares, beyond the registered capital of £25,000.

Erg Industrial Corporation, Ltd.—Increased by £11,901, in £1 shares, beyond the registered capital of £99. The 1,980 1s shares in the original capital have been consolidated and divided into 99 ordinary shares of £1.

Hillman Electrical, Ltd.—Increased by £15,000, in £1 6 per cent cumulative non-redeemable preference shares, beyond the registered capital of £500.

Permali, Ltd. (formerly New Insulation Co., Ltd.).—Increased by £31,000, in 6,000 cumulative preference shares of £1 each and 200,000 ordinary shares of 2s 6d each, beyond the registered capital of £69,000.

Gent & Co., Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £100,000.

B.C.S. Electrics, Ltd.—Increased by £2,000, in £1 shares, beyond the registered capital of £6,000.

Belmos Co., Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £50,000.

Bankruptcies

S. Green, 373, Bolton Road, Darwen, Lancs, electrical contractor.—Receiving order made 21st May on debtor's own petition. First meeting held 5th June. Public examination 20th June at the Court House, 64, Victoria Street, Blackburn.

B. A. Murton, electrician, carrying on business at 54, The Green, Writtle, near Chelmsford, Essex.—Receiving order made 22nd May on debtor's own petition.

First meeting 12th June at 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1. Public examination 27th July at Chelmsford County Court, The Shire Hall, Chelmsford.

W. W. Brown, lately trading as Lombard Electrical Wholesale Supplies, 64, Dagger Lane, West Bromwich, Staffs.—First meeting held 5th June. Public examination 11th July at the Law Courts, Lombard Street West, West Bromwich.

S. I. Rae, carrying on business at 1, Ashburton Road, Gosforth, Northumberland, electrical contractor.—Last day for receiving proofs for dividend 8th June. Trustee, Mr. G. Barr, Conyers Chambers, 135, Sandyford Road, Newcastle-upon-Tyne.

R. Corbett and **I. A. J. Merritt,** carrying on business under the style of Corbett & Merritt, 2b, Junction Road, Andover, electrical and radio engineers. (Separate application of R. Corbett).—Order made 3rd May, suspending discharge for two months until 3rd July, 1951.

C. Welbourn, formerly carrying on business at 158, Hykeham Road, Lincoln, as an electrical engineer and contractor.—Final dividend of 20s in the £, payable 8th June at 340, High Street, Lincoln.

A. Smith and **J. Smith,** formerly carrying on business as "A. & J. Smith" at 550, Bolton Road, Pendlebury, Lancs, electrical contractors.—Application for discharge to be heard 25th June at the Court House, Encombe Place, Salford, 3.

F. Robinson, lately carrying on business at 100, Henshaw Road, Small Heath, Birmingham, refrigerating and electrical engineer.—Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, released 29th May.

J. Bannister, 2, The Wiend, Wigan, electrical contractor.—Last day for receipt of proofs for dividend 15th June. Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2.

A. M. Willmore, 45, King Street, Brighton, electrical and radio engineer.— Adjudication order dated 7th May, 1926, annulled and receiving order dated 7th May, 1926, rescinded on 21st May, 1951, debts having been paid in full.

STOCKS and SHARES

BUSINESS in the Stock Exchange is for the moment of the somewhat spasmodic order. At the lowest prices recently touched, British Government stocks met with a measure of recovery and in the markets for industrial debenture stocks and preference shares an outstanding feature s still the scarcity of supply available for the investor. An occasional disappointment produces a fairly sharp reaction in the price. Southern Areas Electric £1 shares, for instance, dropped 1s 9d to 9s on the preliminary statement and the passing of the dividend. On the other hand, C. A. Parsons at 5¼ are 7s 6d up. Gains of 2s 6d lifted Aron to 42s 6d, Chlorides to 72s 6d, Ward & Goldstone to 46s 6d, Tube Investments to £7. A number of rises of 1s 3d appear throughout the lists. Reyrolle at 87s 6d show a gain of 3s 6d and Siemens are 3s 9d higher. Henley's at 23s are again 1s down on disappointment with the maintenance of the previous dividend. Enfield Cables at 32s are similarly lower. Cable & Wireless ordinary shed 2 points to 125½.

Siemens' Results

After rising sharply last month on the company's decision to raise the dividend to 10 per cent—after fourteen successive payments of 7½ per cent—Siemens' £1 shares have gone further ahead, to 43s 9d, since the circulation of the full accounts. These not only confirm the good financial results of the year's trading, but refer to the company's negotiations for making available to existing stockholders the block of £450,000 ordinary stock at present in the hands of the Custodian of Enemy Property. It originated with an exchange of shares with Siemens & Halske, Berlin, in 1929, and has now to be disposed of. Rumour has been busy for some weeks about the matter of parties interested in a purchase. News is awaited as to whether Siemens have been successful in their proposal.

Anglo-American Telegraph

The Anglo-American Telegraph Company has announced proposals for transferring the seat of management and control of the company to Southern Rhodesia. In referring here last week to the rumour that a transfer of domicile was in contemplation, the country suggested was America, but Rhodesia has been chosen, says the company, because it is the only country with a double taxation agreement which could be fitted into the company's plans. Treasury consent has been obtained, and the company's intention is to reorganize the capital. Stockholders will receive details very shortly.

Miscellaneous Matters

Vactric 5s ordinary shares and 6 per cent preference were quoted respectively around 11s 3d and 16s 9d shortly before last week's announcement concerning dividends. They moved subsequently to 12s and 16s 3d. Profits have made a further recovery, but in view of the company's loan repayment obligations, and of other claims on current resources, no distribution is to be made on either class of capital. Suggestions are under consideration to vary the preference sinking fund provisions until the loan from the Treasury has been repaid. Watford Electric ordinary, quoted at 7s 6d, are ex rights to the new shares. They are 3s premium, and fairly active dealings started on Monday last.

Johnson & Phillips' Preference

Dealings began last week in the new 4½ per cent £1 cumulative redeemable preference shares of Johnson & Phillips. A million shares were offered to ordinary shareholders at par; they are quoted now at a fractional premium on that figure. At present, 5s per share is paid up, with calls due for another 5s on 1st July, and the balance a month later. The purpose of the issue was described in the company's statement by reference to the bank loans of £700,000, to the large sums employed in stocks and work-in-progress, and to projected expenditure of some £300,000 during the next few years. Previously, the company had no debenture or preference stock in issue, so that the new issue has a high priority over earnings. The price is roughly in line with that of the 4½ per cent preference shares of Enfield Cables and Henley's.

Earnings and Dividends

With most of the 1950 company results now published the following table is presented to show, in the case of a dozen leading electrical manufacturers, the year's surplus of earnings available for ordinary share dividends and reserves (expressed as a gross percentage on the ordinary capital), in comparison with the rates distributed. The previous year's corresponding figures are given in parentheses:—

Company	Earnings % 1950	(1949)	Dividends % 1950	(1949)
A.E.I.	100	(93)	20	(15)
Auto Telephone	95	(72)	15	(12½)
B.I.C.C.	39	(47)	7½	(6¼)
Chloride Elec.	72	(62)	15	(10)
Electric Constr.	51	(38)	15	(12½)
Enfield Cable	28	(37)	7½	(7½)
English Electric	45	(38)	15	(10)
Ericsson	124	(..)	22	(..)
	Tax free		Tax free	
C. A. Parsons	215	(141)	15	(15)
Reyrolle	118	(87)	15	(15)
Tel. Construction	31	(30)	10	(8)
Vickers	40	(36)	12½	(6¼)

Engineering in Europe

Survey of Current Literature

TESTS on gas-filled cables at voltages higher than that corresponding to the onset of ionization showed that the latter disappeared when the cable had been exposed to the h.v. for some time and simultaneously the initial ionization gradient increased to a higher value than before the test. This phenomenon was used by designers of h.v. cables for basing their calculations on higher ionization gradients than the initial ones, which leads to a reduction of the necessary thickness of insulation. Various explanations of the phenomenon so far advanced seemed to miss the crux of the matter, which is not susprising, considering the complex character of the thermal, electrical, magnetical and, maybe, even chemical processes contributing.

The author of this article deliberately disregarded all the phenomena other than the effects of a strong electric field and investigated the processes occurring in a gas-layer above several layers of impregnated paper, more particularly when the latter had deteriorated, in an apparatus simulating the corresponding parts of a gas-filled cable. He found that in a deteriorated paper insulation the ionization ceases owing to the increasing conductivity of the paper surface in contact with the gas film. The ionization gradient increases about 30 per cent at the corresponding reduction of the surface resistance of the paper. Where the paper condition has not much deteriorated the impregnating compound is drawn by electric forces into the gas-filled space, the volume of the latter was reduced and the ionization gradient increased accordingly.—" Causes of the Automatic Quenching of the Ionization in Gas-filled Cables, D. D. Zarin, *Elektrichestvo*, No. 2, pp. 13–16, 1951, in Russian.

Circuit Breaking

The main aspects of this subject as well as some results of theoretical and experimental research are discussed, with an instructive comparison of performances of air-blast and small-oil-volume circuit breakers in every respect. A very important point is the relation between breaking capacity and natural frequency of the system, and also between the breaking capacity and the product of breaking current and rate of rise of the recovery voltage.

The problem of rupturing idling lines (" capacitive circuits ") and transformers (" inductive circuits ") may also be reduced to its simplest terms when it is easy to see which of the various characteristics of any particular breaker requires improvement. The favourable effects of increased breaker-speed are manifold and particularly obvious in connection with rapid reclosing. The problem of testing is only outlined, but reference is made to particularly successful Brown Boveri types of breakers and to recent French and Swedish experience.—" Some Special Problems of Modern H.V. Circuit Breakers," F. Grieb, *E.u.M.*, Vol. 68, pp. 98–107, 1st March, 1951, in German.

Switching Interconnectors

The special problems arising from switching operations on interconnecting lines of e.h.v. systems are partly due to the very large short-circuit currents which may be set up and partly to the fact that the actual circuits to be broken may vary considerably between two subsequent operations. On the other hand, the lines served are very long and, when idling, represent high voltage and large capacitance. Stability of the interconnected systems requires high-speed operation, in-phase breaking and automatic rapid-reclosing and, in addition, the high recovery voltages may represent the sum of the recovery voltages of the disconnected systems. Comparative figures of breaking capacity required for 220 kV systems are in France 5 MVA and in U.S.A. 10 MVA. The problems enumerated are analysed for the system operator separately from the needs of the designer. The practical

solution, represented by the new 6·3 MVA, 250 kV air-blast circuit breakers, type ACO of the Société Alsthom, with details of performance and test results obtained in the grid of Electricité de France, is discussed.—" Problems of Circuit-breaking on Lines Interconnecting Very High Voltage Systems," J. Saint-Germain, " *Bull.* Societe Belge des Electriciens," Vol. 67, pp. 1–13, January–March, 1951, in French.

Magnetic Circuits

Bridge measurements of the impedance of ferromagnetic materials for reactor and transformer cores are still the most reliable method for investigating the magnetic properties of these materials, but their claims on time and skill of the personnel make them unsuitable for industrial purposes, especially in mass production of small components of electrical apparatus. Also, more often than not, only part of the characteristic is required and therefore there is no need for a comprehensive series of measurements.

The article by M. Andrieux describes a permeameter which is based on an inductance measurement by a transformer no-load test, the core of this transformer consisting of the magnetic material to be tested. This measuring transformer can be taken to pieces and assembled very rapidly and its windings have only three turns each. The input voltage (60 c/s) is generated by a valve oscillator, not directly applied to the input of the measuring transformer but to a pre-transformer, in order to raise the impedance of the input circuit of the measuring transformer to a reasonable value. A similar transformer is inserted, for similar reasons, into the output circuit of the measuring transformer. The valve-voltmeter measuring the output voltage has four pre-amplifier stages and elaborate rheostat arrangements on input and output sides permit of a high-precision control of the magnetizing current (to obtain field strengths between one and 100 millioersted) and of working the valve-voltmeter always at maximum sensitivity corresponding to the kind of sheets tested.

The arrangement of the whole instrument is very convenient (in two portable units with press-button control and mains supply) and every precaution for noise and other interference suppression has been taken. Frequency stability $\pm 1 \times 10^{-3}$, output voltage stability $\pm$ 2 per cent (for 15 per cent variation of supply voltage). The valve-voltmeter is direct reading with a scale graduated in μH/turn.—" Apparatus for Production Control of the Permeability of Magnetic Circuits," M. Andrieux, *L'Onde Electrique*, Vol. 31, pp. 65–69, February, 1951, in French.

Corona at 400 kV

Although the rising interest in e.h.v. transmission in nearly every country of the world was bound to produce an abundance of papers on the corona, a critical analysis of the bulk of these publications shows that they yield nothing like the complete and systematical information one would expect from them. The volume of data accumulated in tests on transmission lines of every description and design is certainly impressive, but its evaluation sets problems of its own. The method of conversion of losses according to gradients may be applied in comparing lines with equal conductors, but with different spacings between them, whereas a calculation of losses for a certain type of conductor from experimental data gained on another type yields satisfactory results only in the range of high losses: in the low loss range the approximation becomes very crude owing to differences between the critical corona gradients.

The data that have been collected cover a fairly wide range of values of possible losses and yet in the most favourable case furnish a correct order of magnitude of the losses only for any given case. As regards the suitability of the theoretical apparatus evolved, Zaleskii's and Peek's formula represents large losses satisfactorily, and Mayr's formula large and medium losses in fair weather conditions, but certain corrections make it answer to rainy weather conditions as well. The latter formula, and Peterson's, are preferable for engineering calculations. The paper presents the theoretical parameters to be used in the various formulæ, viz., critical gradients, roughness factor, weather factor and the coefficient for determining the variation of the slope of the characteristic $P = f(E)$ in bad weather. Suggestions are made for more systematic tests on experimental e.h.v. lines.—" Corona Problems on 400 kV Lines," N. V. Bogdanoya, *Izvestiya Akademii Nauk*, U.S.S.R. (Otdelenie Tekhnicheskikh Nauk), No. 2, pp. 238–252, February, 1951, in Russian.

Cellulose Manufacture

Motor Driving and Pumping

CELLULOSE acetate, although first prepared in 1865, did not emerge as a commercial substance until its large-scale production for use as a varnish for aeroplanes was commenced during the 1914–18 war. After the war production facilities were far in excess of the small demand for aircraft "dope" and new outlets were sought for it. Between 1900 and 1925 much research took place in this country and America before the conquest of artificial fibre structure was really achieved.

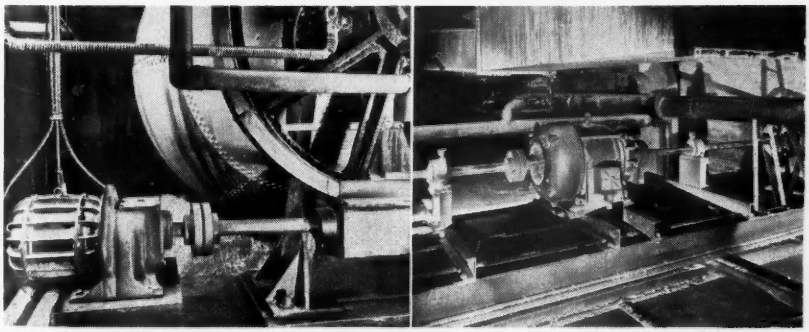
The Cellulose Acetate Silk Co., Ltd., now Lansil, Ltd., was formed in 1928 and from the original spun yarn the company has progressively expanded its activities to embrace all the weaving, knitting, dyeing and finishing processes and the manufacture of garments.

Cellulose is the chief component of the cell membranes of plants and wood, the purest form being obtained from cotton. The longer fibres, which are detached from the seeds by ginning, are used for making normal cotton yarns and fabrics. The remaining shorter fibres, called linters, are removed by a delinting machine. Three cuts are taken from this "waste" and it is the second-cut linters that form the basic material for acetate yarn production at the Lancaster factory.

Impurities are removed by chemical treatment in the following ways. The linters are boiled in keirs in an alkali solution (caustic soda) of a definite strength under precise conditions of time and temperature. The keirs are large spherical boilers employing 15 h.p. flange-mounting explosion-proof motors driving through gearing. The linters, now slightly improved in colour, are next well washed to remove soluble impurities and solids, such as sand, before the cellulose is pumped from the keirs to the bleaching tanks for further purification by a dilute solution of sodium hypochlorite, which is sprayed into the tanks and recirculated by pumps driven by totally enclosed surface cooled motors.

The bleached cellulose is pumped to washing and heating machines for final water treatment, which frees it from the last traces of chemicals. It is then passed down chutes to hydro-extractors that remove 50 per cent of the water, leaving a snow-white mass, which is passed by a fan and hopper feeder to a drying tunnel through which it is conveyed by an endless belt. Thermostatic control ensures drying to the correct moisture content. Hot air

Left: **Flange type 15 h.p. flameproof motor driving keir for cleaning cotton.** *Right:* **Double ended 25 h.p. surface cooled motor driving belt in tunnel for drying cotton linters after purifying**



is blown into the tunnel by thirty-two fans, sixteen on each side, driven by 2·75 h.p. Brook totally enclosed surface cooled motors directly through flexible couplings.

It is essential that the linters should contain at least 99 per cent alpha-cellulose, of good colour and uniform moisture content, preferably 4 to 5 per cent. Samples are taken at regular intervals to the general laboratory before acetylation. In this process the cellulose is treated with a mixture of acetic acid, acetic anhydride and sulphuric acid, careful control of temperature being imposed in the early stages. As the reaction proceeds, the cotton gradually goes into solution and this is allowed to continue until a test sample, examined under the microscope, is seen to be free from fibre. The clear and resinous product has now reached the "primary," or triacetate, stage and if precipitated in water would form a hard hornlike mass; it would be soluble in chloroform, but not in acetone, which is the solvent commonly used in the acetate rayon and plastics industries.

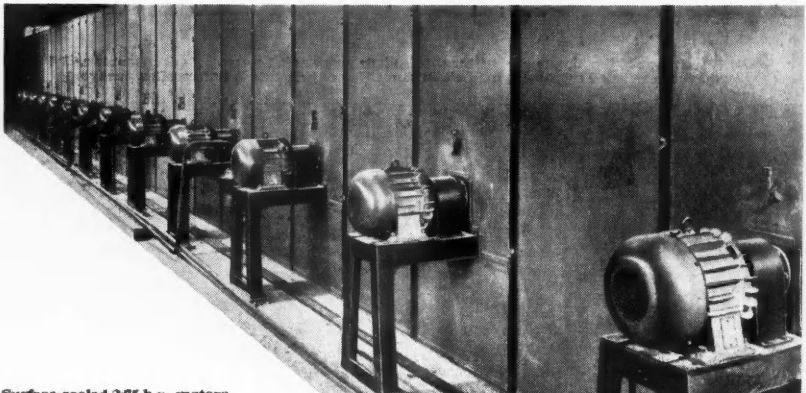
The primary acetate must therefore be made soluble in acetone and this is done by "ripening," or hydrolysis. A calculated amount of water is added and the mixture well stirred before it is poured into the ripening pans where it is allowed to stand in a warm room until the routine laboratory tests indicate that an acetate of good solubility in acetone has been obtained.

The solution is next precipitated by the addition of water, or weak acid, an operation needing much care; if the addition is too slow a poor fibre or powdery acetate will result, rendering subsequent operations difficult. When precipitation is completed the liquor, containing approximately 40 per cent acetic acid, is drained from the fibres into collecting vats. The precipitator is then refilled with water or dilute acid to harden the fibre, after which the charge is dropped into small vats containing false bottoms with run-off valves, for further washing until the fibres are free from acid.

Dilute acid used in processing is converted in a recovery plant into glacial acetic acid and acetic anhydride for re-use in the production of more quantities of acetate. The transmission of the acid through the many pipe lines needs a large pumping installation, involving surface cooled motors of various powers and a group of 1 h.p. flameproof machines where the corrosive conditions occur.

Final hydrolysis and stabilization are completed by boiling in a very dilute acid solution, followed by washing with purified water which is treated in a special section. The stabilized acetate is centrifuged and dried in washed air, leaving a 5 per cent moisture content. It is then ground and blended to ensure uniformity and samples of each batch are subjected to laboratory tests. The acetate is then ready for use as plastic moulding material, or for spinning into textile yarns.

Before the spinning process cellulose acetate is mixed with acetone and a small

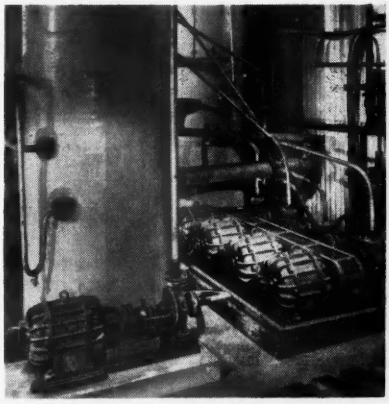


Surface cooled 2·75 h.p. motors, sixteen each side, driving fans in drying tunnel

quantity of water, the viscosity and concentration being carefully tested by sampling from the mixer. It is next filtered and blended to remove all particles of solid matter. The clarity and viscosity of the liquid are under constant scrutiny to ensure that the standard is maintained.

The rather startling transformation from liquid to shining thread is accomplished very quickly by forcing it through a series of fine holes in a jet. The holes are usually about two to three thousandths of an inch in diameter and the acetone evaporates as soon as the streams of viscous solution are exposed to the heated air, leaving a solid filament. The group of filaments issuing from each jet forms a yarn which, with the assistance of a lubricant, is wound on to a bobbin. A twist is imparted during the process to complete the spinning of the filaments. By adding dyes or pigments to the spinning solution coloured or dull yarns can be spun instead of the normal bright yarn.

Brook electric motors ranging from 1 h.p. to 100 h.p. are used in many parts of the plant, including the new power house completed last year which is designed to make full use of pass-out steam for processing purposes.



Flameproof 1 h.p. motors directly coupled to pumps in acetic acid section

Australian Electrical Manufacture

THE output of Australian factories engaged in the manufacture of electrical machinery and equipment was valued at £A34,710,000 in 1948–49, an advance of nearly 25 per cent on the previous twelve months. Ten years previously the total was £7 million. The principal lines of manufacture are here tabulated, with notes of increases or decreases on 1947–48. The group totals may include goods made at works not wholly engaged in electrical manufacture. In addition to the items shown in the table the following appear in the 1948–49 returns but not in those for the preceding year:—Cooking stoves £A1,260,000, "stovettes" £A550,000, household refrigerators, absorption type £A1,017,000, compression type £A4,818,000, and commercial refrigerators £A699,000.

Class of Goods	1948–49 £A(000)	Inc. or dec. on 1947–48 £A(000)
Alternators	57	— 12
Generators	288	+ 143
Motors (for sale):—	2,306	+ 560
Under 1 h.p.	933	+ 100
1 h.p. and under 2½ h.p.	368	*
2½ to 5 h.p.	338	*
5 h.p. to 10 h.p.	232	*
10 h.p. to 50 h.p.	275	*
50 h.p. and over	160	*
Transformers and convertors above 20 kVA	622	+ 121
Ditto below 20 kVA:—	570	+ 20
For use in neon signs	57	*
For use in radio and toys	155	*
For use in supplying power and light	244	*
For other industrial use	114	*

* Comparative figures not available.

Class of Goods	1948–49 £A(000)	Inc. or dec. on 1947–48 £A(000)
Storage batteries and accumulators:	1,762	— 1,114
For automobile and radio	1,432	+ 52
Power plant	150	*
Primary wet	180	*
Apparatus for telegraphy and telephony	2,192	+ 725
Electric meters	699	+ 29
Apparatus for regulating, starting and controlling	2,414	+ 392
Household fittings (switches, etc.)	913	+ 171
Portable tools and appliances	352	+ 7
Neon signs and "cold" lighting	1,058	+ 248
Measuring and recording apparatus excluding meters	277	+ 186
Fans	369	+ 45
Irons	284	— 18
Radiators and fires	240	+ 77
Toasters	187	— 3
Washing machines	296	— 241
Vacuum cleaners (domestic)	749	— 91

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

5051. Sperry Gyroscope Co., Inc.—Electro-magnetic cavity resonator apparatus and circuits therefor. 17th March, 1944. (655241.)

1945

23003. Murphy Radio, Ltd., Davies, K. S., and Hawkins, G. F.—Radio transmitting and receiving stations. 23rd March, 1949. (655244.)

23625. Electroflo Meters Co., Ltd., and Gemmell, D. C. N.—Regulating or controlling systems. 20th September, 1946. (655423.)

1946

30587. Radio Corporation of America.—High-frequency electron-discharge tube circuit arrangements. 14th October, 1946. (655247.)

30914. Concordia Electric Safety Lamp Co., Ltd., and Lucas, H.—Lighting devices. 5th January, 1948. (655248.)

31692 & 33682. Concordia Electric Safety Lamp Co., Ltd., and Cornish, J. P.—Electric lamps. 8th & 29th December, 1947. (655249/50.)

1947

15150. British Thomson-Houston Co., Ltd., and Pool, W. J.—Sectional machine drives. 18th March, 1948. (655253.)

18142. Compagnie Générale d'Electricité.—System for receiving equal length telegraph or like signals. 9th July, 1947. (655383.)

19120. Igranic Electric Co., Ltd. Automatic electric overload circuit breakers. 17th July, 1947. (655388.)

19296. Igranic Electric Co., Ltd.—Electric switches of the push-push type. 18th July, 1947. (655389.)

19297. Igranic Electric Co., Ltd.—Electric snap-action switches. 18th July, 1947. (655390.)

19786. Hazeltine Corporation.—Traffic signalling system. 23rd July, 1947. (655391.)

19917. British Thomson-Houston Co., Ltd.—Temperature compensating mechanisms. 24th July, 1947. (655392.)

21716. Sperry Gyroscope Co., Inc.—Radio distance-measuring apparatus utilizing the Doppler effect. 7th August, 1947. (655396.)

22225. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—High-frequency induction heating apparatus. 11th August, 1947. (655400.)

25878. Landis & Gyr Soc. Anon.—Device for measuring and recording variations of the frequency of alternating currents. 23rd September, 1947. (655405.)

26254. American Air Filter Co., Inc.—Electrostatic or electric gas cleaners. 29th September, 1947. (655407.)

26379. Sperry Products, Inc.—Supersonic testing apparatus. 30th September, 1947. (655408.)

26595. British Thomson-Houston Co., Ltd.—Magnetrons. 2nd October, 1947. (655409.)

26794. Lines, A. W.—Electro-magnetic wave propagating structures. 18th September, 1948. (655410.)

27037. General Railway Signal Co.—Electric plug couplers. 8th October, 1947. (655412.)

27064. Automatic Electric Laboratories, Inc.—Wire recording system. 8th October, 1947. (655302.)

29029. Philips Electrical, Ltd.—Electric discharge tubes and electronic amplifiers and oscillation generators. 30th October, 1947. (655308.)

32341. Foxboro Co.—Measuring apparatus for the comparison of d.c. potentials or capacities. 8th December, 1947. (655359.)

32422. Philips Electrical, Ltd.—Electric contact pins. 9th December, 1947. (655310.)

32592. Philips Electrical, Ltd.—Methods of and means for assembling electrode systems for electric discharge tubes. 10th December, 1947. (655312.)

32806. Western Electric Co., Inc.—Dielectric lenses. 12th December, 1947. (655315.)

32956. Ateliers de Constructions Electriques de Charleroi.—Apparatus for examination of materials by means of ultrasonic waves. 15th December, 1947. (655318.)

33286. Standard Telephones & Cables, Ltd.—Facsimile telegraph systems. 17th December, 1947. (655320.)

34842. Staatsbedrijf der Posterijen Telegrafie en Telefonie.—Receiving circuit for signalling system in which criteria are transmitted by a bridge marking method. 30th December, 1947. (655369.)

34975. Staatsbedrijf der Posterijen Telegrafie en Telefonie.—Supervisory circuit for a start-stop telegraph system. 31st December, 1947. (655371.)

35218. Brush Development Co.—Methods of and apparatus for producing magnetic recordings. 31st December, 1947. (655373.)

1948

3557. British Thomson-Houston Co., Ltd.—Insulating rods for operating electric switches. 6th February, 1948. (655378.)

5434. Johnson, W. A.—Aerial systems. 16th February, 1949. (655436.)

7405. Taylor, A. E.—Cyclotrons and high-frequency resonators therein. 6th April, 1949. (655270.)

7406. Snowden, M., and Taylor, A. E.—High-frequency resonators for use in cyclotrons. 10th March, 1949. (655271.)

7407. Whitby, H. C.—High-frequency resonant circuits. 9th March, 1949. (655272.)

9995. Bendix Aviation Corporation.—Electronic timers. 9th April, 1948. (655437.)

10673. Lansing Bagnall, Ltd., and Arnot, A. E. R.—Electric motor control gear. 14th April, 1949. (655413.)

12157. Pye, Ltd., and Peach, E. R.—Radio-frequency transformers. 3rd May, 1949. (655414.)

23048. A. B. Du Mont Laboratories, Inc.—Shielded ultra-high-frequency cathode-ray tube. 1st September, 1948. (655331.)

23734. Telephone Manufacturing Co., Ltd., and Smith, S. J.—Impulse operated indicating mechanisms. 10th October, 1949. (655440.)

26685. Metropolitan-Vickers Electrical Co., Ltd., and Baumann, K.—Gas reheater arrangements for gas turbine power plant. 11th October, 1949. (655443.)

30262 & 30264. Cinema-Television, Ltd., and Freeman, G. S. P.—Television pick-up tubes or the like. 20th October, 1949. (655290/1.)

30872. Johnson, K. C.—Arrangements for producing variation or modulation of the natural frequency of a resonant circuit. 20th October, 1949. (655449.)

1950

5642. Radio Corporation of America.—High-frequency electron-discharge tube circuit arrangements. 14th October, 1946. (655295.)

NEW BOOKS

Modern Fluorescent Lighting. By A. D. S. Atkinson. Pp. 159; figs. and tables. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 15s.

Since the author's book "Fluorescent Lighting" was published seven years ago the subject has developed so rapidly and so much experience has been gained that an entirely new book has been needed for some time. The present volume is an attempt, and a highly successful one, to meet that need, and Mr. Atkinson is to be congratulated on having produced within a limited compass a remarkably complete treatment of the lamps and their circuits as well as of the many ways in which they can be used in modern lighting practice.

Any criticism of the book is mainly confined to matters on which there is certainly more than one opinion. For example, the louvred ceiling receives much more detailed treatment than the louvred fitting, although the latter is by far the more popular in this country at present and will probably remain so for a long time to come, if not permanently. In this connection it is interesting to note that one of the great drawbacks of the louvred ceiling, the cost of cleaning, is practically ignored.

The book contains a very valuable collection of tables, some giving coefficients of utilization for a large number of types of fluorescent fittings and others the electrical characteristics and light output values of fluorescent lamps in the range of ratings and colours marketed by the Electric Lamp Manufacturers' Association in this country. The book can be strongly recommended both to the illuminating engineer and to anyone else who is interested in the use of fluorescent lamps.—J.W.T.W.

Electrical Engineering Theory and Practice. Edited by Philip Kemp, M.Sc., M.I.E.E. Pp. 1964; illus. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price £10 the set of three volumes.

These well produced volumes are said to be intended to cover the main outlines of the whole field of electrical engineering, but it should be stated that the term is not here taken as relating to communications, wired or wireless, and electronics. Industrial heating and metallurgical and chemical applications of electricity are apparently also outside its scope. The article on traction might well have included a section on diesel-electric locomotives. Apart from these, the claim for comprehensiveness is well substantiated by 48 contributors of professional standing, who have ably co-ordinated existing practice in 54 independent sections.

The work is not a semi-popular treatise nor yet an encyclopedia, but an exposition of scientific and applied engineering principles for technically fairly well advanced students, in the sense that, in the constantly widening field of electricity, engineers can never cease to be students.

The arrangement of the contents is that, as far as practicable, the three volumes deal approximately with different aspects. The first covers the more academic side, such as basic theories and technology, materials, education and training and notes on electrical pioneers. It also includes measurement and instruments, power cables, accumulators and illumination. The second volume, dealing mainly with machines, also contains monographs on economics, heat engines, steam and hydro-electric power stations, substations and high-voltage transmission and the grid.

In the third volume distribution (with its legal aspects) is covered. There are in addition articles on private generating plant, installation work and on applications of electricity to various factory processes and to agricultural, medical, marine, welding, aircraft, automobile and domestic uses. The concluding section deals with resuscitation from electric shock based on the *Electrical Review* chart. The price of the publication in our view is a small one having regard to the value of the authoritative information it provides.—C.O.B.

Books Received

Power System Stability. Vol. II. Power Circuit Breakers and Protective Relays. By E. W. Kimbark. Pp. 288; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 64s in U.K.

Fractional Horse Power Motors. By S. F. Philpott. Pp. 367; figs. and index. Chapman & Hall, Ltd. Price 30s.

Library Lighting

Battersea Polytechnic Installation

ADVANTAGE was taken of the recent redecoration of the Edwin Tate Memorial students' library at the Battersea Polytechnic, London, to modernize the lighting installation. The library was given to the college about forty years ago by Edwin Tate, chairman of the Board of Governors, at a cost of about £8,000 and is in traditional style with fine oak panelling and stained glass windows.

The original features have been preserved; bookcases form small alcoves, or compartments, as an aid to concentrated study. Double glazing has been fitted to the lower windows to reduce the noise of passing traffic; although successful in this respect the amount of natural light admitted to the library was considerably reduced.

The method of lighting can be divided into three categories. The curved section of the ceiling offered a perfect situation for cornice general lighting. The cornice is mounted above the balcony and houses a total of thirty-six 5ft 80 W "Sieray" warm white lamps, overlapped to provide continuity in effect. One complete side of the cornice can be switched on at a time. The chokes and power factor condensers are remote from the cornice and the "Sieray Y8" control unit is used. The interior of the cornice is painted white and the exterior is an off white to match the general decorations. This part of the scheme provides a fairly even intensity at table level of about 9 lumens/sq ft.

For local reading fluorescent light is provided on the tables by specially designed 3ft, 4ft and 5ft fittings. Each has a cut-off reflector so that from normal angles there is no distraction by the direct view of the light source. An opal "Perspex" inset gives the fittings a more attractive appearance and reduces brightness contrast.

The average illumination on the table tops is between 30 and 35 lumens/sq ft, which is considered sufficient to enable the detailed drawings to be studied. Each fitting has a special on-off switch and the control gear for each fitting is housed in a box under the table; the wiring to them is chased into the parquet flooring and flush covered with brass strips.

Supplementary, or pilot, lighting consists of three glazed tungsten drum fittings mounted directly to the ceiling and inset in plaster rosettes. The 300 W lamps are mounted in a gallery.

The installation is the combined effort of the Polytechnic electrical staff and Siemens' Illuminating Engineering Department.

Relighted Battersea Polytechnic students' library showing fluorescent table lamps and general illumination from ceiling cornice

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 23rd June.

SUNVAC. No. 697,518. Class 7. Pumps and condensers all included in Class 7.—Sunvic Controls, Ltd., 10, Essex Street, Strand, London, W.C.2.

BARTLETT. No. 678,085. Class 9. Coffee percolators, coffee pots, kettles, urns, boiling pans and saucepans, all being electrical goods.—G. F. E. Bartlett & Son, Ltd., 30–34, Bell Street, London, N.W.1.

CINETONE. No. 693,278. Class 9. Cinematograph projector equipment included in Class 9.—Cinetone Equipment Co., Ltd., 317, Euston Road, London, N.W.1.

MAXIPRINT. No. 696,673. Class 9. Electrical apparatus and instruments included in Class 9; measuring, signalling and checking (supervision) instruments and apparatus; and instruments and apparatus for recording variations in atmospheric conditions and for recording the quantity of electrical energy consumed or supplied.—Landis & Gyr Aktievgesellschaft, Zug, Switzerland. Address for service, c/o D. Young & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

PICOPACK. No. 697,509. Class 9. Electrical condensers.—Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, London, W.3.

UNISTOR. No. 697,646. Class 9. Asymmetric electrical resistors.—Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

STABILEC. No. 694,915. Class 11. Electrically-heated laboratory ovens.—Baird & Tatlock (London), Ltd., 14–17, St. Cross Street, London, E.C.1.

RONNING. No. B695,666. Class 11. Electrical drying devices for insertion in shoes.—D. E. B. Rasmussen, trading as Ronning & Co., 7, York Place, Adelphi, W.C.2.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—4th July. Queensland State Electricity Commission. Supply of 14,000 insulators and insulator ironwork for 66 kV transmission line. (C.R.E. (I.B.) 62027/51. Ten/2531.)*

22nd August. Four 1,000 kVA transformers. (C.R.E. (I.B.) 61862/51. Ten/2512.)*

Belfast.—22nd June. Electricity Department. Cranes, boiler feed pumps and circulating water screening plant for Victoria power station. (See 1st June issue.)

13th July. Automatic chlorinating plant, Harbour power station. (See this issue.)

Breconshire.—County Council. Electrical installation at Maesydderwen Grammar/Secondary School. (See this issue.)

Brighton.—25th June. Borough Waterworks Department. Chlorinating apparatus; duplicate electrically driven pumping units, with control gear, etc., for Shoreham pumping station improvement scheme. Waterworks engineer, 12, Bond Street.

Carlisle.—18th June. City Council. Electrical installations in 62 houses. City engineer, 18, Fisher Street.

Egypt. — CAIRO. — 23rd June. Director General, Cairo Electricity & Gas Administration. Supply of 65 km of power cable. (See this issue.)

9th July. Supply of 26,650 a.c. meters. (See this issue.)

Ely.—18th June. R.D.C. Two centrifugal pumps, complete with electric motors and automatic switchgear. Silcock and Simpson, 10, Park Row, Leeds, 1.

Exeter.—25th June. City Council. Cables for Pynes Waterworks. (See this issue.)

Halifax.—19th June. Corporation. Re-electrification of Sunnyside Schools. (See 1st June issue.)

New Zealand.—21st June. Government Railways. Three 3-ton electric overhead travelling cranes. Tenders to New Zealand Government Offices, 415, Strand, W.C.2. (C.R.E. (I.B.) 62317/51. Ten/2533.)*

Romford.—25th June. Corporation. Electrical installations in 22 bungalows. (See this issue.)

South Africa.—BLOEMFONTEIN.—31st July. City Council. Overhead electric travelling crane. (C.R.E. (I.B.) 61209/51. Ten/2490.)*

Stafford.—23rd June. Corporation. Street lighting equipment. (See this issue.)

Swinton and Pendlebury.—18th June. Borough Council. Rewiring lighting and power installations at Victoria House, Swinton. (See 1st June issue.)

Uruguay.—MONTEVIDEO.—22nd June. Ferrocarril Central del Uruguay. Material for telephone trunk lines. (C.R.E. (I.B.) 61602/51. Ten/2526.)*

ORDERS PLACED

Bradford. — Corporation. Recommended. Modification of electric wiring at Dumb Mills, Frizinghall (£4,790).—B.S.C. Electrics, Ltd.

Isle of Ely.—County Council Education Committee. Installation of electrical services at new junior and infants' school at Leverington Road, Wisbech (£1,363).—Ely Electrical Co.

Northampton.—Corporation Libraries and Museums Committee. Recommended. Renewal of electrical and lighting installations at Central Library (£3,731).—East Midlands Electricity Board.

Northumberland.—Education Committee. Electrical installation at Haydon Park Hostel (£336).—Robson & Coleman, Ltd.

Seaton Valley.—U.D.C. Electrical installations in 64 houses at Cramlington and Seghill.—J. B. Wilson (Whitley Bay).

Washington (Durham).—U.D.C. Electrical installations in 50 houses at Blue House Lane (£1,114).—Den Lea Electricals.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bingley.—Factory, Crossgates; Waddington & Moore, Ltd., Faversham Street Works, Bradford.

Birkenhead.—Houses (36), Mount estate; borough architect.

Birmingham.—Two pavilions at Central Hospital, Hatton, for Birmingham Regional Hospital Board; D. A. Goldfinch, architect, 10, Augustus Road, Birmingham.

Alterations, etc., to Delicia Stadium, Gosta Green (£14,550), for T.C.; H. J. Manzoni, city engineer.

Blaenau Festiniog.—Factory for disabled persons; M. T. Pritchard, architect, Wynn Road, Blaenau Festiniog.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Blandford (Dorset).—Flats (24), King's Road; L. Magnus Austin, architect, 51, Towngate Street, Poole.

Bradford.—Houses (128), Elmfield estate; city architect.

Bristol.—Showrooms, etc., Broadmead; Montague Burton, Ltd., Hudson Road Mills, Leeds, 9.

Bury.—Erection of Fairfield C.P. School; Neodox, Ltd., Manchester.

Cardiff.—Teaching hospital and medical school at The Heath; Board of Governors, United Cardiff Hospitals.

Castle Ward.—New Council Chamber for R.D.C.; surveyor, North Road, Ponteland.

Chepstow (Mon).—Conversions at Mounton House, for school for delicate children (£47,529); county architect, Queen's Hill, Newport, Mon.

Chichester.—Houses (56), Parklands estate; city surveyor.

Dover.—Central works depot at Coombe (£16,500 for first stage); borough surveyor, Maison Dieu House.

Durham.—Rural domestic economy centre for the C.C. (£25,000); county architect, Court Lane, Durham.

Hostels at Durham, Jarrow, Stanley and Winlaton (£135,000); G. R. Clayton, county architect, Court Lane.

East Retford.—Houses (22), Mattersey, for R.D.C.; G. E. Burman, Union Street, Retford.

Frome.—Dwellings (50), Weymouth Road and Rossiters Road (£64,946) for U.D.C.; Selleck, Nicholls & Co., builders, East Hill, St. Austell.

Fulwood (Lancs).—Additional classrooms at Watling Street County School (£11,568); J. Turner & Sons, Ltd., Preston.

Gainsborough (Lincs).—Houses (40), Whites Wood Lane site, for U.D.C.; B. Pumfrey, Ltd., Wintern Works, Lee Road.

Gateshead.—Secondary school, Dryden Road; H. J. Cook, chief architect, Municipal Buildings.

Gravesend.—Flats (53), Valley Drive; borough engineer.

Great Yarmouth.—Process building, pumping and water systems and other buildings, South Denes site, for Herring Industry Board; H. W. Cremer, engineer, 17, Queen Anne's Gate, London, S.W.1.

Permanent houses (140), Magdalen College estate; borough engineer, Town Hall.

Halesowen.—Houses (50), Hasbury Farm estate; A. & J. Mucklow, Ltd., Halesowen.

Hebburn-on-Tyne.—Nine shops and flats, Hartleyburn and Campbell Park housing sites (£18,843); J. M. Black, Ltd., builders, Glen Street, Hebburn.

Hedon (Yorks).—Houses (34), New Road; Roper, Spencer and Hall, architects, Suffolk Chambers, Scale Lane, Hull.

High Wycombe.—X-ray and chest clinic at War Memorial Hospital; Thurlow, Lucas & Janes, architects, 25, High Street.

Knutsford.—Houses (24), Thorneyholme estate, for U.D.C.; Kemps (Contractors), Ltd., Altrincham.

Leeds.—Reorganization of kitchens and maternity block at St. Johns Hospital (£40,000); W. J. Morley & Son, architects, 269, Swan Arcade, Bradford.

Liverpool.—Police headquarters at Eaton Road, West Derby; Dr. R. Bradbury, city architect.

London.—CITY.—Office block adjacent to Guildhall for City Corporation; Sir Giles Gilbert Scott, architect, 3, Field Court, Gray's Inn, W.C.1.

PADDINGTON.—Seven blocks of multi-storey flats (386 dwellings of various types), Hallfield estate, Bishop's Bridge Road; W. H. Bentley, town clerk, Town Hall, Paddington, W.2.

Northolt.—Factory for Walter Kidd & Co., Ltd.; Percy Bilton, Ltd., contractors, 111, Park Street, W.1.

Nuneaton.—Additions for engineering & mining laboratories, drawing offices, commerce, science, etc., as second stage of College of Further Education (£209,000); county architect, Warwick.

Research laboratories at Lindley; Motor Industry Research Association, Great West Road, Brentford.

Oxford.—Flats (84) and 10 dwellings, Iffley Road; city architect.

Inorganic chemistry laboratory for University; Lanchester & Lodge, architects, 10, Woburn Square, W.C.1.

Romford.—Houses (70), Fullers Farm estate; borough surveyor.

Two infants' schools, Harold Hill estate, for Essex C.C.; Dowsett Engineering Construction, Ltd., 7, Hobart Place, S.W.1.

Royston (Herts).—Fire and ambulance station; county architect, County Hall, Hertford.

Scarborough.—Conversion of the Wessex Hotel into flats (£12,000); C. W. Haynes, Ltd., builders, Albemarle Back Road, Scarborough.

Seaham.—Houses (40), Westlea site, for U.D.C.; Thomas Armstrong, Ltd., builders, Robson Street, Newcastle-on-Tyne.

Sheffield.—Food and egg packing and distribution centre; John Wragg & Co., Ltd., wholesale provision merchants, Bath Street.

Slough (Bucks).—School, Burnham Priory estate; county architect, County Offices, Aylesbury.

Southport.—Extensions to technical college; Wm. Eaves & Co., Ltd., Marton, Blackpool.

South Shields.—Block of flats, Lawe Road (£24,000); J. Reid, borough engineer, Town Hall.

Stockport.—Houses for Borough Council: G. A. Lomas & Co., Ltd., Ungard Lane, Brinnington, Stockport (53 houses) and Poole & Foster, Ltd., 49, Plymouth Avenue, Ardwick, Manchester (58 houses).

Stockton - on - Tees.—Transport depot (£104,000); borough architect, 124, High Street.

Stretford.—Factory and offices, Warwick Road, Trafford Park, for International Biscuit Co., Ltd.; Jones & Rawlinson, Ltd., Salford.

Watford.—Special school, Horseshoe Lane, for Herts E.C.; county architect, County Hall, Hertford.

Whiston.—Pithead baths at Bold Colliery; N.C.B. Architects' Department, Jacey House, Oxford Street, Manchester.